

CLASS 92, EXPANSIBLE CHAMBER DEVICES**SECTION I - CLASS DEFINITION**

(A) This class relates to devices which include an expansible chamber, said chamber having a wall portion thereof (i.e., a working member) movable in a to and fro motion to vary the volume of the chamber, and having a fluid conducting passage means in communication with the chamber for introducing or withdrawing fluid therefrom, said device being the type in which:

(1) The introduction of fluid into the chamber or the withdrawal of fluid from the chamber acts upon the movable wall portion and effects a movement thereof in a direction to change the volume of the chamber and produce a mechanical force output which is employed to do work (e.g., motor) or

(2) Application of a mechanical force to the movable wall portion effects a movement of such movable wall portion in a direction to change the volume of the chamber to draw fluid into or expel fluid from the chamber (e.g., pump).

(B) This class also takes miscellaneous subcombinations of motors or pumps disclosed as being of the type having a chamber as indicated in part A, above, not involving control of the working fluid and not provided for in other classes, (e.g., bellows walls, diaphragms or pistons).

(C) This class excludes means to control the fluid to or from the chamber, except in the case of a sealing means for a working member which is adapted under certain conditions of operation to flex away from the encompassing chamber wall to allow fluid passage between said means and the chamber wall.

- (1) Note. Claims Not Controlling In Patents Prior To 1936. Patents issued prior to 1936 have not necessarily been classified by claims so that the placement of these patents does not necessarily indicate lines of classification. However, most of the patents regardless of their age have been placed in accordance with their claimed subject matter.

STATEMENT RELATING TO PLACEMENT OF PATENTS INVOLVING COMBINATION AND SUBCOMBINATION SUBCLASSES

In many instances the schedule of this class provides for a combination which requires

a given subcombination and elsewhere below provides for the subcombination.

The following rule has been followed as to the placement of the original patent and as to cross-referencing and should be followed in the future:

Where the combination subclass requires the same subcombination as is provided for in the subcombination subclass (i.e., subcombination defined with the same specificity in both subclasses) a patent disclosing the combination is placed as an original in, or under, the combination subclass regardless of whether the claims are directed to the combination or subcombination and is not cross-referenced to the subcombination subclass. A patent disclosing only the subcombination and claiming same is placed as an original in the subcombination subclass and is not cross-referenced to the combination subclass.

This rule is applicable only in instances where there is but a single subcombination subclass (i.e., no indented subclasses), but the combination subclass may be further subdivided into indented subclasses.

The prime feature of this situation is that the subcombination must, by definition, be of equal specificity in the two subclasses. A search for the subcombination, at least in the case where it is adapted to be used in the combination, of necessity involves all of the patents in the combination subclass. Under this system of placing the patents a complete search of the combination can be made in the combination subclass, and of the subcombination in both subclasses without the addition to the search files of the otherwise necessary cross-reference copies.

The subclasses involved in this combination-subcombination relationship have been indicated in the schedule by numbers in parenthesis, as explained in a paragraph after the class title.

See Lines With Other Classes and Within This Class, below for the exemplary of this situation in the Class 92 schedule.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

EXEMPLARY IN THE CLASS 92 SCHEDULE

Exemplary of this situation (as described in the Class Definition, above) in the Class 92 schedule are subclasses 11 and 12. It is noted that subclass 11 provides for a working member combined with means to control the flow of nonworking arresting fluid therefor in which said flow control means is responsive to the position of the working member and an auxiliary adjustable throttle for further controlling such flow while subclass 12 merely requires an adjustable throttle for controlling such flow. As between these subclasses a patent having a disclosed means responsive to the position of the working member for controlling the flow of nonworking arresting fluid for a working member combined with an auxiliary adjustable throttle is placed as an original in subclass 11, whether or not working member position control means is claimed and is not cross-referenced in subclass 12. A complete search for the subject matter provided for in subclass 12 of necessity involves all of the patents in subclass 11.

COMBINATIONS WITH LOAD DEVICES

Inasmuch as a mechanical force output of an expansible chamber device within the definition of this class is to operate or move a load the inclusion of the load in the claim by name only or in general terms will not exclude a patent from this class. An exception to this general rule exists where the load on the expansible chamber device is a valve. The combination of an expansible chamber device and a valve as the load moved thereby, even if the valve is claimed by name only, is excluded from this class and will be found in Class 137, Fluid Handling, or Class 251, Valves and Valve Actuation.

This line also applies where the load is a tool: that is, a named tool moved by the expansible chamber will not exclude a patent from this class if no tool details are recited. However, if a support for the work being acted upon by the tool is claimed, classification in the appropriate tool class results even though both the tool and the support are claimed by name only. Also see Search Class 173 note in References to Other Classes, below, for the line with regard to a nominally claimed tool driven by an expansible chamber device combined with other features such as work cleansing or tool feeding.

No attempt has been made to review the classification of all patents found in classes relating to loads adapted to be moved by an expansible chamber device. Thus, it is to be noted that the original classification of all patents is not consistent with the above statement as to nominally claimed loads and this particularly applies as to classes not recently reclassified. In those instances in which a body of art is known to exist in a given class in which the load adapted to be moved by the expansible chamber device is claimed only nominally, and especially where the classification of that class provides for a fluid pressure actuator for the device, currently issuing patents will not be classified as originals in Class 92 even though the load is only nominally claimed. The means which transmits power from the working member of the expansible chamber device to the load to be moved (e.g., linkage, gearing, etc.) is not considered to be the load to be moved by the expansible chamber device. See References to Other Classes, Search Note to Class 74, for a discussion of this subject.

RELATIONSHIP TO CLASS 91.

For the relationship between this class and Class 91, see “(3) Note” in the class definition of Class 91.

RELATIONSHIP TO CLASS 60

Class 92 is directed to expansible chamber devices per se of the type which includes an oscillating or reciprocating working member and is generally related to Class 60, as a subcombination of a Class 60 device of the type which includes an expansible chamber.

More specifically the line may be categorized as follows:

A. PLURAL OR COMBINED WITH A MOTOR

(1) The combination of an expansible chamber device of the type set forth in part (A), (1), of the class definition above combined with a motor of a different type is classified in Class 60. However, the combination of a Class 92, Expansible Chamber Devices with a motor which performs work solely for use by the expansible chamber device (e.g., move the working member, or adjust a part thereof) is classified in Class 92. The combination of a plurality of Class 92, Expansible Chamber Devices having a

plurality of working members (e.g., pistons) is classified in Class 92.

B. WORKING FLUID SOURCE, MODIFICATION OR EXHAUST TREATMENT

(1) Pumps. The inclusion in a claim of a pump broadly which provides motive fluid for utilization by the Class 92, Expansible Chamber Devices does not preclude classification in Class 92. The following examples have been considered to be nominal inclusion of a pump and if so claimed would not preclude classification in Class 92: (a) a pump; (b) a rotary pump; (c) a motor driven pump; (d) a motor driven rotary pump; (e) an internal combustion engine having an intake manifold (as a source of vacuum); (f) a plurality of pumps arranged in parallel; (g) a circuit comprising a sump, pump and expansible chamber device.

The following examples have been considered to be significant inclusion of a pump and if so claimed would preclude classification in Class 92 and cause classification in Class 60, if otherwise appropriate:

(a) a pump which is characterized as to type, e.g., centrifugal, eduction, constant displacement, variable displacement, pulsator, etc. (however, see (b) in the preceding paragraph)

(b) a motor driven pump in which the motor is characterized as to type, e.g., turbine, electric motor, internal combustion engine (however, see (e) in the immediately preceding paragraph)

(c) a pump which has any detail thereof recited as, for example, a "piston"

(d) a plurality of pumps in series

(e) a particular physical relation between a nominal pump and (1) a motor supplied thereby or (2) with a sump, reservoir or tank forming part of the circuit supplying the pump. For example, this particular physical relation may include their relation in space or mechanical interconnection means.

See particularly Class 60, subclasses 325+.

(2) Accumulators.

An expansible chamber device in constant communication with an accumulator for pressurized working fluid is not precluded from Class 92 regardless of the specificity with which the accumulator is recited, the accumulator in this case being considered

to be merely a part of the expansible chamber.

(3) Internal Generation.

Class 60 takes an expansible chamber device in which the working fluid within the expansible chamber device is heated or cooled, as, for example, by a fluid in heat exchange relation with the interior of the chamber. Such fluid may be the same working fluid used in the chamber either before or after it passes through the chamber. However, a mere heat exchange space or jacket associated with the chamber through which a heat exchange fluid may be circulated is not excluded from Class 92, unless some means are provided to control the flow of heat exchange fluid into or out of the space or jacket. See Class 60, subclass 508.

(4) Heating, Superheating or External Generation

An expansible chamber device having a nominally claimed means to heat or superheat the working fluid before introduction into the expansible chamber is not precluded from Class 92. For example, Class 92 takes a boiler combined with an expansible chamber device while a "fire tube boiler" combined with a Class 92 expansible chamber device would be classified in Class 60. See, for example, Class 60, subclasses 643+.

Class 92 does not take the combination of an expansible chamber device with an explosive generation of working fluid even if nominally claimed. See, for example, Class 60 subclasses 632+.

(5) Exhaust Treatment or Handling

Class 60 takes combinations involving treatment of motive fluid after it leaves an expansible chamber where means is claimed to change some characteristic of the fluid. A condenser, muffler or filter are examples of such means, but the inclusion of a condenser, muffler or filter in a claim by name only is not sufficient to preclude a patent from Class 92.

Class 60 also takes combinations involving handling of exhaust fluid from a fluid motor. Handling is considered to necessarily include more than a mere pipe or chamber to conduct the exhaust fluid away. However, an exhaust fluid conductor having a number of ports therein merely for the

purpose of dividing the exhaust stream is more than a mere chamber or pipe and is classified in Class 60. Claimed limitations to an elbow, support or other fitting which constitutes a mere part of the exhaust pipe will be ignored, but any significant relation of the pipe and expansible chamber device will result in classification in the appropriate exhaust treatment subclass of Class 60. A particular physical relation or mechanical inter-connection between a chamber or reservoir for receiving exhaust fluid from the motor and the motor has been considered exhaust handling for Class 60. See Class 60, subclasses 272+ and 685+.

C. PULSATORS

Class 60 takes a pulsator system in which a generally constant mass of confined working fluid is moved by the working member of one expansible chamber device to effect movement of the working member of said expansible chamber device. Where only one of the expansible chamber devices forming a pulsator system is claimed, classification is generally in Class 92. However, see (3) Note of the definition of subclasses 533+ of Class 60 for a list of pulsator elements or subcombinations classifiable in Class 60.

SECTION III - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 232+ for an expansible chamber type volume or rate of flow meter. Class 73 takes an expansible chamber meter combined with registering mechanism and a meter incapable of general use as an expansible chamber device. A meter is considered to be incapable of such general use if there is no disclosed means to take power therefrom for external use such as to a registering mechanism. Therefore class 92 takes an expansible chamber device disclosed as a meter having means to take power therefrom such as for an unclaimed registering mechanism; subclasses 700+ for a fluid pressure gauge. Class 73 takes a sealed capsule disclosed as forming a pressure sensing means. Class 73 also takes an expansible chamber device combined with a means to indicate the condition being sensed

by the deflection of the movable wall of the expansible chamber device.

74, Machine Element or Mechanism, appropriate subclasses for a mechanical movement, gearing or element. Class 74 takes a motion converting linkage, gearing or element there provided for even though a piston and cylinder is recited where such piston and cylinder amounts to no more than a named load on or drive source for the linkage, gearing or element; even a recitation of a geometrical or spatial arrangement of plural pistons and cylinders is not considered to constitute more than a named load or drive source and does not preclude classification in Class 74. A support, casing, housing or covering (e.g., a crankcase) may also be included in a claim to a Class 74 mechanism, provided that only so much detail of such support, casing, housing or covering is recited as to constitute a support or enclosure for the mechanism. For example, a machine element such as a crankshaft which, per se, is classifiable in Class 74 will still be in Class 74 even though a crankcase or cover therefore is recited. Similarly a mechanical movement (e.g., a piston, connecting rod and crankshaft) which, per se, is classifiable in Class 74 is still proper for Class 74 even though it includes a piston housing (e.g., cylinder) and crankshaft housing (e.g., crankcase). Class 92 takes a casing for a crankshaft or other Class 74 element where disclosed as being associated with an expansible chamber device either where such casing is claimed, per se, or where the Class 74 element is nominally claimed.

123, Internal-Combustion Engines, for an expansible chamber device which is limited for use as a part of an internal combustion engine. Class 123 has not been cleared and many expansible chamber devices which are not limited for use in an internal combustion engine will be found in Class 123 without any stated line or perceptible distinction with the subject matter found in Class 92.

124, Mechanical Guns and Projectors, subclasses 56+ for a fluid pressure actuated gun in which a projectile is impelled from a confined space or barrel by the force of a fluid under pressure.

138, Pipes and Tubular Conduits, subclasses 30+ for a fluid pressure compensator for a fluid system, comprising a chamber provided with a movable wall (e.g., piston or diaphragm) to allow the volumetric capacity of said chamber to be varied, and disclosed as for receiving and

- accommodating a surge of fluid in the system; subclasses 118+ for a circumferentially corrugated or pleated flexible tubular member of conduit. Class 92 takes such a device where the sole specific disclosure or a claim is directed to a bellows device for an expansible chamber device; appropriate subclasses, for a tubular member, even though disclosed as a cylinder for an expansible chamber device. Class 138 takes a tubular member disclosed as a cylinder for an expansible chamber device, where the claim is directed to no more than the wall structure of such tubular member.
- 173, Tool Driving and Impacting, appropriate subclasses for an expansible chamber device for operating an impact delivering means or for operating a tool combined with work cleansing or feed means and see section IV of the class definition of Class 173 for a statement of the line between Class 92 and Class 173.
- 184, Lubrication, appropriate subclasses for lubrication of general utility, and particularly subclasses 18+ for lubrication of an engine cylinder. Class 184 takes a nominal cylinder and piston provided with lubricating means. Class 92 takes the combination of a cylinder and piston and lubricating means therefor where either the cylinder or piston is modified for a purpose other than for lubrication. Claimed structural limitations, for example, such as sealing means between the cylinder and piston or specific piston construction effects classification in Class 92. However the claiming of a pitman or connecting rod pivotally secured to a piston including means to lubricate such connection does not preclude classification in Class 184.
- 187, Elevator, Industrial Lift Truck, or Stationary Lift for Vehicle, especially subclasses 213+ for an expansible chamber fluid motor in claimed combination with a more than named stationary lift for raising a vehicle in its entirety between spaced vertical positions, and subclasses 272+ for an expansible chamber fluid motor in claimed combination with a more than named load-underlying support surface (e.g., external load support guide structure which is not necessary to the fluid motor internal drive, particular load-underlying support surface structure, elevator counterbalances).
- 188, Brakes, appropriate subclasses for brakes and locks of general utility and particularly, subclasses 297+ for a fluid type brake or dashpot. Class 188 takes a fluid containing chamber having a movable wall (e.g., piston and cylinder) or an element thereof where the sole specific disclosure or a claim is directed to a dashpot or brake; subclass 67 for a brake or lock for a rod which may include a piston. Class 188 takes a piston and cylinder combined with a movement retarding or preventing means, where the piston and cylinder is only nominally set forth in the claim.
- 220, Receptacles, appropriate subclasses for the structure of a device disclosed as a cylinder for an expansible chamber device, where the claimed subject matter includes no more than the structure of a container and particularly subclasses 200+ for a container closure. Class 220 takes the combination of a cylinder and a closure or head therefor, or a cylinder closure or head, per se, where the claimed subject matter includes no more than a container and closure or a container closure of general utility. Class 92 takes such combination or the closure, per se, where the claim includes subject matter which limits the device to an element of a working chamber for an expansible device, such as for example fluid porting in the closure, or means on the closure for cooperating with a piston part.
- 222, Dispensing, subclasses 206+ for a resilient wall dispenser, and subclasses 386+ for a dispenser comprising a container or cylinder provided with a follower (e.g., piston) adapted to act against a fluent material to expel the material from the chamber. Class 222 takes a combined container and follower where the sole specific disclosure or a claim is directed to a dispenser for fluent material. However, Class 92 takes a claim to a follower or piston, per se, even though disclosed as for use in a dispensing device.
- 251, Valves and Valve Actuation, subclasses 12+ for a fluid pressure actuated valve, and especially subclasses 61+ for a valve having a fluid actuator which includes a diaphragm, bellows or flexible wall type expansible chamber device and subclasses 62+ for a fluid actuator comprising an expansible chamber device having a cylinder with a relatively movable piston therein. Class 251 takes a nominally recited valve combined with an expansible chamber device actuating means therefor; subclasses 324+ for a reciprocating piston type valve and subclass 331 for a reciprocating diaphragm type valve. Class 251 takes a piston or diaphragm when there is a disclosure that such piston or diaphragm is used as a valve element.

- 254, Implements or Apparatus for Applying Pushing or Pulling Force, subclass 93 for a fluid actuated pushing or pulling implement. Class 254 takes a fluid pressure actuated pushing or pulling implement where some detail of the load engaging means is claimed.
- 267, Spring Devices, appropriate subclasses for a fluid type spring device. Class 267 takes a device comprising a chamber provided with a movable wall (e.g., piston and cylinder) and adapted to contain a fluid designed to contact and exert a force against said movable wall, or an element of such device (e.g., piston) when there is a disclosure that such device is used as a spring device.
- 277, Seal for a Joint or Juncture, appropriate subclasses for a packing or sealing member, even though disclosed as sealing between relatively movable elements of an expansible chamber device. Class 277 takes a nominally claimed piston and cylinder combination, or a nominally claimed piston or cylinder, per se, where the claim is otherwise directed to a packing or sealing means between relatively movable surfaces of said cylinder and piston or on said cylinder or piston. Class 92 takes such devices, where some details of the cylinder or piston is set forth in the claim. However, structure of such device which is solely intended to cooperate with the packing or sealing means is not considered a detail of the device for Class 92, and is classified in Class 277. A device including either a flexible cup or flange type sealing member combined with a supporting body structure is classified in Class 92 where such device is disclosed as a piston for either a pump or motor. Such sealing structure either claimed, per se, or combined with a supporting body structure and disclosed as a device other than a piston for a pump or motor is classified in Class 277.
- 374, Thermal Measuring and Testing, subclasses 201+ for expanding fluid thermometers. Class 374 takes, expanding fluid bulb or expansible chamber driving an indicator. Such a bulb or chamber with an indeterminate load is classified in Class 60, subclasses 516+; an expansible chamber, per se, is in Class 92; and a bulb, per se, is in Class 428, subclass 35.
- 384, Bearings, appropriate subclasses for bearings and guides. Class 384 takes a nominally claimed piston and cylinder combination as a guide and slide where the claim is otherwise directed to a specific surface structure of one, or both of said elements to form a bearing surface. Further the combination of a nominal cylinder having an opening in an end wall thereof slidably receiving a piston rod is considered a slide and guide and classified in Class 384. Class 92 takes the above combination where the piston is claimed. subclasses 429+ for a crankshaft bearing support. Class 384 takes an engine crankcase enclosing and supporting bearings for a crankshaft, the inclusion of a nominal cylinder, or cylinders does not preclude classification in Class 384. Class 384 takes a nominal piston, or cylinder where the claim is otherwise directed to a specific surface structure to form a bearing surface.
- 403, Joints and Connections, particularly subclasses 230+ for a rod connected to a base plate or head. Class 403 takes the combination of a nominally claimed piston and means for either pivotally or rigidly mounting a rod thereto where the subject matter claimed amounts to no more than a connection between a rod or a means to pivotally mount a rod and a tubular or cup-shaped member. Class 92 takes such combination where some detail of the piston other than that which is utilized solely for the purpose of effecting the joint or connection between the piston and the rod or rod mounting member is claimed. For example, claimed features involving sealing means on the piston, specific piston forming material, ribs or fins on the piston other than those utilized to support or mount the rod or rod mounting means on the piston, or structure in which a portion of the rod or rod mounting means extends through the piston end face are considered as piston details and are classified in Class 92.
- 417, Pumps, and see the class definition of Class 417, for a statement of the line.
- 475, Planetary Gear Transmission Systems or Components, for planetary gear transmissions, per se. The same line exists between Class 92 and Class 475 as exists between Class 92 and Class 74.
- 477, Interrelated Power Delivery Controls, Including Engine Control, for interrelated controls between an engine and a transmission, clutch, or brake. Class 477 was formed from patents in Classes 74 and 192 and so the same line exists between Class 91 and Class 477 as exists between Class 91 and Classes 74 and 192.
- 604, Surgery, subclasses 218+ for piston and cylinder type hypodermic device, and subclasses 212+ for a pump type syringe. Class 604, Sur-

gery, provides for a device which includes no more than a piston and cylinder or other type of expansible chamber device, or any subcombination thereof, but in which the sole specific disclosure or claim is directed to a hypodermic dosing device or syringe.

SECTION IV - GLOSSARY

CYLINDER

A rigid external member which permanently surrounds the piston, the latter constituting a relatively moving wall for the expansible chamber, the other walls of which are formed by the cylinder, and the cylinder ordinarily including the abutment or reaction surface against which the motive fluid acts, or the piston forming the abutment for the cylinder when the cylinder is movable and the piston fixed. However, the abutment or reaction surface for the piston need not necessarily be formed by the cylinder but may be formed by a second relatively movable opposed piston within the cylinder.

END FACE

The end face of the piston consists of the portion thereof which is opposite the abutment or reaction surface of the cylinder and which is adapted to contact the working fluid.

NONWORKING CHAMBER

Any space within a part of an expansible chamber device which is not designed to receive working fluid for acting upon the working member, or for being acted upon by the working member.

PISTON

A working member which has relative sliding sealing engagement with the encompassing wall of a cylinder type working chamber. The principal parts of a piston consist of an end face portion and a side wall portion which are defined as follows:

SIDE WALL

The side wall of the piston consists of that portion which is opposite the wall of the cylinder which slidably engages the piston.

WORKING CHAMBER

The space in an expansible chamber device which includes the working member and which is adapted to receive working fluid for acting upon the working member, or for being acted upon by the working member.

WORKING FLUID

The fluid which is admitted into or withdrawn from the expansible chamber to effect movement of the working member, or the fluid which is either drawn into or expelled from the expansible chamber responsive to movement of the working member.

WORKING MEMBER

The wall portion of the expansible chamber of an expansible chamber device which is acted upon by the working fluid to be moved thereby to change the volume of the chamber and produce a mechanical force output, or which, having a mechanical force applied thereto is moved to change the volume of the chamber to either draw fluid into or expel fluid from the chamber. The term includes the movable wall portion and any part which is immovably fixed thereto (e.g., piston rod).

SUBCLASSES

- 1 This subclass is indented under the class definition. Apparatus including temperature responsive means associated with the expansible chamber device, said means being effective to overcome or counteract a pressure change, which effects the expansion or contraction of the expansible chamber device, resulting from a change in the ambient temperature adjacent the expansible chamber device, or a change in the temperature of the working fluid.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclass 708 for a fluid pressure gauge provided with temperature compensating means.
- 137, Fluid Handling, subclasses 79+ for temperature compensating means for a fluid handling apparatus.

- 2 This subclass is indented under the class definition. Apparatus comprising two or more working members which are movable with respect to each other, said working members being operatively associated with a single member designed to transmit the mechanical force

exerted by said working members, one of said working members being effective to impart longitudinal movement to said element, and a second said working member being effective to impart rotary motion to said element about the longitudinal axis thereof independently of the longitudinal movement imparted by said first working member.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclass 61 for a rotary type expansible chamber device combined with a reciprocating working member.
- 173, Tool Driving or Impacting, subclass 108 for means to rotate a reciprocated impact delivering tool, said means comprising a separate reciprocating type motors.

- 3 This subclass is indented under the class definition. Apparatus comprising a first rotary element driven by a source of power, a second rotary element connected to the working member to drive same, and means to selectively engage or disengage said first and second rotary elements to connect or disconnect the working member and source of power.

SEE OR SEARCH CLASS:

- 417, Pumps, subclass 319 for pumps having disengageable rotary drive connections. For the relationship between Class 92 and Class 417 see section III of the class definition of Class 417.

- 5 This subclass is indented under the class definition. Apparatus including (1) an indicator, register, recorder or alarm responsive to a condition of operation or position of a part of the expansible chamber device or of the working fluid or (2) a window in a wall of an expansible chamber device part to permit inspection of normally hidden portions of said part or of the working fluid.

- (1) Note. An expansible chamber device part made of a material which may be transparent (e.g., a glass piston or cylinder) is excluded, unless the disclosure specifies that such material was used for the purpose of allowing inspection of interior portions of said part.

- (2) Note. A visible element associated with an expansible chamber device (e.g., fastening or securing means for an expansible chamber device parts) which is specifically intended to become distorted when some malfunction of some part of the expansible chamber device occurs to indicate such malfunction is included under this definition.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclass 1 for a signal, indicator or inspection window to indicate a condition of operation of an expansible chamber type motor.
- 340, Communications: Electrical, subclasses 500+ for electrical automatic condition responsive indicating systems.

- 6 This subclass is indented under the class definition. Apparatus in which the expansible chamber device is provided with means whereby the area of the working member end face which is acted upon by the working fluid or which acts upon the working fluid during movement of the working member may be selectively changed.

- 7 This subclass is indented under the class definition. Apparatus including means movable with the working member, said means comprising a portion which moves in an arcuate path between end limit positions corresponding to the end limits of the working member stroke, said means being effective during the first half of the working member stroke and while said portion moves toward a center position between said end positions to exert a force in a direction resisting the movement of the working member, and during the last half of the working member stroke while said portion moves away from said center position to exert a force in an opposite direction to assist the movement of the working member.

SEE OR SEARCH CLASS:

- 123, Internal-Combustion Engines, subclasses 192.1+ for compensating means for an internal combustion engine.

- 8** This subclass is indented under the class definition. Apparatus comprising a body of non-working fluid adapted to flow as a result of working member movement and incident to said flow to retard or stop the movement of the working member, and means for varying the flow of the nonworking fluid.
- (1) Note. A mere compressible fluid spring provided with valve means to allow entry of make-up fluid in the spring is excluded.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
134, for a fluid spring for biasing a working member.
- SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclass 41 for correlated control of motive fluid, and locking means for the working member of an expansible chamber device.
188, Brakes, subclasses 297+ for fluid type brake or dashpot; Class 188 takes the nominal recitation of a cylinder and piston and a fluid brake or dashpot therefor.
- 9** This subclass is indented under subclass 8. Apparatus in which the body of fluid is positioned in an enclosure having a movable partition therein which is in sliding sealing engagement with the enclosure wall providing a pair of chambers, said partition being secured for movement with the working member, fluid passage means extending between said chambers for placing said chambers in fluid communication with each other, and flow varying means positioned in said passage means.
- 10** This subclass is indented under subclass 8. Apparatus in which the flow varying means is controlled in response to the working member attaining a certain position in the working chamber.
- 11** This subclass is indented under subclass 10. Apparatus including a second means for varying the flow of the non working fluid, said second means being adapted to be selectively moved and held to different flow varying positions.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
12, for a means to control the flow of non-working arresting fluid for a working member comprising an adjustable throttle.
- 12** This subclass is indented under subclass 8. Apparatus in which the flow varying means is adapted to be selectively moved and held in different flow varying positions.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
11, for a working member position control of flow of nonworking arresting fluid for working member provided with an auxiliary adjustable throttle. Note section IV of the class definition and the paragraph following the title in the schedule of this Class.
- 12.1** This subclass is indented under the class definition. Apparatus comprising two or more cylinders, each cylinder being provided with a relatively reciprocating piston (includes diaphragm) to thereby form a plurality of expansible chambers, the cylinders or a transmission element in common operative engagement with said cylinders or pistons being adapted for continuous rotation about a fixed axis; said cylinders being physically arranged in a manner such that their longitudinal axes either (1) intersect at a common point or (2) extend parallel to said axis of rotation; there being provided means to selectively vary either the extent or end limits of reciprocatory movement between said cylinders and their respective relatively reciprocating pistons.
- SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclass 473 for expansible chamber type motors having three or more cylinders arranged in parallel, radial, or conical relationship with a rotary transmission axis in which means are provided for controlling the drive transmission of the motor in response to a sensed condition and subclasses 497+ for expansible chamber type

motors having three or more cylinders arranged in radial relationship with a rotary transmission axis and means for varying the relative reciprocatory stroke between the motor cylinders and pistons.

- 417, Pumps, subclasses 218+ for means for controlling an adjustable cam or linkage in a pump drive transmission in response to a sensed condition.

12.2 This subclass is indented under subclass 12.1. Apparatus in which the longitudinal axes of said plural cylinders are parallel to and spaced from said axis of rotation.

- (1) Note. This definition is not intended to include displacement control in response to a sensed condition (e.g., speed or motive fluid condition responsive).

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclass 473 for expansible chamber type motors having three or more cylinders arranged in parallel, radial, or conical relationship with a rotary transmission axis in which means are provided for controlling the drive transmission of the motor in response to a sensed condition and subclasses 504+ for expansible chamber type motors having three or more cylinders arranged in parallel relationship with a rotary transmission axis and means for varying the relative reciprocatory stroke between the motor cylinders and pistons.

- 417, Pumps, subclasses 222.1+ for means for controlling an adjustable axial pump operating cam in the pump drive transmission in response to a sensed condition.

13 This subclass is indented under the class definition. Apparatus comprising means associated with the expansible chamber device, said means being adapted to be selectively positioned or moved and held in different positions to either change the extent or vary the end limits of reciprocatory movement of the working member relative to the working chamber.

- (1) Note. Means which acts to positively lock a working member in both directions of reciprocatory movement is not considered to be a stroke varying device under this definition, such subject matter being classified in subclasses 15+ below.

- (2) Note. An expansible chamber device having means to vary the displacement thereof and in which it cannot be determined whether the expansible chamber device is of the Class 92 or Class 418 type will be classified under this definition.

- (3) Note. Included under this definition are diaphragm or bellows type working members which are reciprocated to cause expansion or contraction of the chamber formed thereby.

- (4) Note. This definition is not intended to include stroke control in response to a sensed condition (e.g., speed or motive fluid condition).

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 62+, for plural relatively movable working members in which one of said working members is moved by a second working member through a separating abutment connection.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclass 167 for an expansible chamber motor comprising a unit having separately controlled working chambers the extension of which equals the sum of the individual chamber extension.

- 417, Pumps, subclasses 499+ for means to effect control of a pumping member controlled port at different positions of the pumping member stroke by changing the extent or varying the end limits of the pumping member reciprocatory path.

- 13.1** This subclass is indented under subclass 13. Apparatus in which the means which is moved or positioned to change the extent of movement of the working member is actuated by a motor.
- SEE OR SEARCH CLASS:
91, Motors: Expansible Chamber Type, subclass 506 for a motor operated means to adjust the angle of inclination of a reaction plate for plural radial cylinders for the purpose of varying working chamber displacement.
- 13.2** This subclass is indented under subclass 13. Apparatus in which the expansible chamber is defined in part by a deformable wall, movement of said deformable wall being caused by or effecting expansion and contraction of the chamber.
- (1) Note. The deformable wall of the above definition may be either (1) fabricated of flexible material or (2) formed by a plurality or relatively movable rigid members hinged together in a manner such that relative pivotal movement thereof is caused by or effects expansion and contraction of the chamber.
- 13.3** This subclass is indented under subclass 13. Apparatus in which the extent of movement of said working member is changed relative to and independent of the extent of movement of another relatively movable working member.
- SEE OR SEARCH CLASS:
417, Pumps, subclass 429 for plural pumps having a common drive and means for altering the stroke of one relative to another.
- 13.4** This subclass is indented under subclass 13. Apparatus in which the means which is moved or positioned to change the extent of movement of the working member is limited to be moved and held or positioned in one or more preselected adjustment locations and not capable of being held or positioned in locations other than or intermediate of said preselected positions.
- 13.41** This subclass is indented under subclass 13.3. Apparatus in which the means which is moved or positioned to change the extent of working member movement comprises an element which is either (1) removed from the device and replaced therein in a different position or location, (2) removed from the device or, (3) assembled to the device.
- 13.5** This subclass is indented under subclass 13. Apparatus in which the means which is selectively positioned or moved and held in different positions changes the extent of reciprocatory movement of a single working member in one stroke direction only; there being provided additional means which is selectively positioned or moved and held in different positions for changing the extent of reciprocatory movement of said working member in the other stroke direction, said additional means being selectively positionable or movable separately and irrespective of movement of said first mentioned means.
- 13.51** This subclass is indented under subclass 13. Apparatus in which the working member forms a pair of axially spaced working faces which are normally rigidly interconnected, the selectively positionable or movable means being effective to change the axial spacing of said working faces for the purpose of changing the extent of reciprocatory movement of said working member.
- 13.6** This subclass is indented under subclass 13. Apparatus in which the means which is selectively positioned or moved to change the extent of working member movement comprises an element having a portion which is positioned within the confines of the working chamber and exposed to working fluid therein; the portion of said element within the working chamber being either (1) fixed against movement by the working member and engageable therewith to limit the extent of working member movement or (2) positioned on the working member for movement therewith and engageable with a fixed member (e.g., cylinder end wall) for limiting the extent of working member movement.
- 13.7** This subclass is indented under subclass 13. Apparatus in which there is provided means for transmitting motion to or from the working

member comprising at least one element (e.g., cam, gear, link, etc.), which is mechanically associated with and movable relative to the working member; the selectively positionable or movable means for changing the extent of working member movement being operatively associated with said relatively movable transmission element to either (1) limit the motion of said element for changing the extent or varying the end limits of working member or (2) change the driving relationship of said element relative to the working member or another element of the transmission for the purpose of changing the extent or varying the end limits of working member movement.

SEE OR SEARCH THIS CLASS, SUBCLASS:

12.1+, for plural cylinders arranged in parallel, radial or conical relationship with a rotary transmission axis and having means which is selectively movable to adjust a relatively movable transmission element for varying the displacement of the cylinder working chambers.

13.8 This subclass is indented under subclass 13. Apparatus in which there is provided an element carried by piston type working member which extends axially therefrom to a location exterior of the working chamber (e.g., piston rod), the portion of said element exterior of said working chamber being provided with screw threads for threadably engaging the means which is positionable or moved and held for changing the extent of working member movement.

14 This subclass is indented under the class definition. Apparatus comprising an element positioned to be moved by a working member, said working member being capable of limited relative motion with respect to said element, and means engageable with said element to prevent movement thereof, said means being engageable by said working member during the initial portion of its stroke to disengage said means from operative position with respect to said element to allow movement of said element in response to further movement of said working member.

15

This subclass is indented under the class definition. Apparatus comprising means engageable between a working member or a member moved thereby and a fixed part, said means when engaged being effective to prevent the movement of said working member relative to said part in at least one direction of its movement at some point along the path of travel thereof, said means being selectively disengageable to permit movement of the working member in such direction.

- (1) Note. The movement preventing means may be held in operative working member movement preventing position by the working fluid in the working chamber, or may be released from such operative position by such working fluid.
- (2) Note. The movement preventing means may hold the working member against movement either from the action of a mechanical force exerted thereon or from a force exerted thereon by working fluid acting against the end face thereof.
- (3) Note. For classification under this definition the means must be released before any movement of the working member in the direction in which it is held against movement can occur. A mere resilient detente which is releasable responsive to a movement of the working member is excluded from this definition. Such structure is classified in subclass 30.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 8+, for a means to control the flow of non-working arresting fluid for the working member.
- 13+, for an adjustable or disengageable stop or abutment means for varying the extent of reciprocatory movement of the working member.
- 30, for a resilient detente engageable between a fixed part and a working member or a member moved thereby.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclass 41 for a correlated control of motive fluid, and locking means for

- the working member of an expansible chamber motor.
- 188, Brakes, appropriate subclasses for a brake or latch, per se, and particularly subclass 67 for a brake or latch for a rod. Class 188 takes a nominally claimed piston and cylinder, if the claim is otherwise directed to a brake or latch means for holding the piston against movement relative to the cylinder.
- 16 This subclass is indented under subclass 15. Apparatus including means for actuating the movement preventing means, said first means being capable of causing a predetermined period of time to elapse before actuation of the movement preventing means is effected.
- (1) Note. A device in which the movement preventing means is actuated by a fluid pressure responsive member, which device includes adjustable throttling means in a fluid conduit to said fluid pressure responsive member to regulate the flow of fluid to said member to vary the time required to sufficiently increase the fluid pressure to said member to actuate the movement preventing means after initiating flow of such fluid in the conduit, is included under this definition.
- 17 This subclass is indented under subclass 15. Apparatus comprising an element having the axis thereof coinciding with the axis of the working member, said element being connected to the working member so that reciprocation of the working member effects relative rotation between said working member and element, and in which the movement preventing means is adapted to engage said element to prevent rotation thereof relative to said working member, and thereby prevent movement of the working member.
- 18 This subclass is indented under subclass 15. Apparatus in which the movement preventing means comprises an element having intermeshing engagement with the working member or member moved thereby, said element being adapted to intermesh with said working member or member moved thereby at plural predetermined spaced locations corresponding to spaced locations of the working member along its path of travel, at least one of said locations corresponding to a position between the opposite extremities of said path of travel.
- 19 This subclass is indented under subclass 18. Apparatus in which means are provided to bias the intermeshing element toward engaging position with the working member or member moved thereby, so that the intermeshing element is self engaging as the working member or member moved thereby reaches one of said predetermined locations.
- 20 This subclass is indented under subclass 15. Apparatus comprising a member by which power is transmitted to or from the working member, said member being connected to said working member to permit relative movement therebetween and in which the movement preventing means is adapted to engage said member to prevent movement of said member and the working member.
- 21 This subclass is indented under subclass 15. Apparatus in which the movement preventing means is movable either to engage or disengage position by two or more separate means, said means being distinct from each other and being operable independently of each other.
- 22 This subclass is indented under subclass 15. Apparatus comprising two or more working members which are movable with respect to each other and movement preventing means to prevent movement of each of said working members, said movement preventing means for each of the working members being actuated by another of said working members.
- 23 This subclass is indented under subclass 15. Apparatus in which said movement preventing means includes an element providing intermeshing engagement between the working member and a fixed member.
- (1) Note. A member projected into a cylinder in a direction transverse to the direction of movement of the piston to overlie an end face of the piston to prevent movement thereof past said member is considered as intermeshing with the piston and is included in this subclass.

- 24** This subclass is indented under subclass 23. Apparatus in which the intermeshing element is moved to or from, or retained in working member movement preventing relationship by means of a member which is movable relative to said intermeshing element, said member being movable responsive to the action of a pressure fluid.
- 25** This subclass is indented under subclass 24. Apparatus including a mechanical motion converting means including a pivoted link between the intermeshing element and the fluid pressure actuated member so that motion of the member will be transmitted to said intermeshing element through said pivoted link.
- 26** This subclass is indented under subclass 24. Apparatus in which the element is formed of flexible resilient material.
- 27** This subclass is indented under subclass 23. Apparatus in which the intermeshing element is moved to or from intermeshing relationship with the working member responsive to the action of a pressure fluid.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 24, for an intermeshing movement preventing means actuated by a relatively movable fluid pressure responsive member.
- 28, for a fluid actuated releasable stop or latch means for a working member.
- 28** This subclass is indented under subclass 15. Apparatus in which the disengageable means is moved to or from working member movement preventing relationship responsive to the action of a pressure fluid.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 24, for an intermeshing movement preventing means actuated by a relatively movable fluid pressure responsive member.
- 27, for an intermeshing movement preventing means actuated by a pressure fluid. Note the class definition, Statement Relating To Placement Of Patents Involving Combination And
- Subcombination Subclasses, and the paragraph following the title in the schedule of this class.
- 29** This subclass is indented under the class definition. Apparatus in which the working member is provided with a passage extending axially therethrough, and including an element designed to transmit movement to or from the working member, said element extending through the passage and mounted for sliding movement relative to the working member, and releasable interengaging means for selectively coupling or uncoupling the working member to the element to allow or prevent relative movement between said working member and element.
- 30** This subclass is indented under the class definition. Apparatus comprising a spring biased member having cooperative intermeshing engagement between the working member or a member moved thereby and a relatively movable element, the intermeshing engagement being such that relative movement between the working member or the member moved thereby and the relatively movable element effects disengagement of the spring biased member from cooperative intermeshing engagement.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 15+, for a resiliently biased latching means for a working member which latching means must be released before movement of the working member can occur.
- 31** This subclass is indented under the class definition. Apparatus comprising an element positioned with the axis thereof coinciding with or parallel to the axis of the working member, said working member and element being slidably interengaged and including cooperating means therebetween such that (1) said element has rotary movement and the working member has rectilinear movement or (2) the element is fixed and the working member has both rotary and rectilinear movement.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclasses 25+ for a mechanical movement for converting reciprocatory motion to or from rotary motion, and particularly subclasses 55+ for a cam and slide for converting reciprocatory motion to or from rotary motion. Class 74 takes such mechanical movements even though a piston and cylinder are nominally recited.
- 91, Motors: Expansible Chamber Type, subclass 233 for a valveless expansible chamber type motor, in which the control of the motive fluid is effected by rotary motion of the working member responsive to the reciprocation thereof.
- 123, Internal-Combustion Engines, subclass 45 for an internal combustion engine provided with a piston which rotates responsive to the reciprocation thereof.
- 417, Pumps, subclass 492 and 500, for a pump provided with a piston which simultaneously reciprocates and axially rotates.
- 32 This subclass is indented under subclass 31. Apparatus comprising means engageable between the element and a fixed part, and being effective to allow rotation of the element relative to the fixed part in one direction of movement of the working member, and to prevent rotation of said element relative to the fixed part in the other direction of movement of the working member, said means being moved to or from engaged position responsive to the action of the working fluid for the expansible chamber device.
- 33 This subclass is indented under subclass 31. Apparatus in which the element is positioned to extend through a portion of the working member in some position of axial movement of the working member.
- 34 This subclass is indented under the class definition. Apparatus comprising a flexible structure which is capable of expanding to increase the volumetric capacity thereof, said structure comprising (1) a tube of flexible material having a circumferentially corrugated or pleated

wall, (2) at least two annular plates arranged in superposed relation, said plates being hingedly secured together in sealed relation along their inner peripheral edges only or (3) a pair of rigid plate like members pivoted together along a portion of their peripheral edges, the remaining peripheral edge portion of said plates being joined together by a flexible member which is pleated in some position of relative pivotal movement of the plate like members.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 89+, for a collapsible wall type expansible chamber device.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 262+ for a volume or rate of flow meter which includes a bellows type expansible chamber, and subclass 729.1 for a bellows type fluid pressure gauge.
- 74, Machine Element or Mechanism, subclasses 18+ for a flexible sealing element of the bellows type attached to a relatively movable rod and casing.
- 137, Fluid Handling, subclass 510 for a line condition change responsive valve having a separate connected fluid reactor surface in which the reactor surface comprises a bellows.
- 138, Pipes and Tubular Conduits, subclass 21 for a corrugated flexible tube, or pipe of general utility. Class 92, Expansible Chamber Devices takes a corrugated tubular member where the sole specific disclosure or a claim is directed to a bellows element for an expansible chamber device.
- 251, Valves and Valve Actuation, subclasses 61+ for a valve having a flexible wall fluid actuator including a bellows type expansible chamber device.
- 285, Pipe Joints or Couplings, subclasses 226+ for a bellows type flexible joint between rigid members.
- 374, Thermal Measuring and Testing, subclass 203 for a bellows type thermometer.
- 417, Pumps, subclasses 472+ for expansible chamber type pump incorporating a bellows element.

- 35** This subclass is indented under subclass 34. Apparatus comprising two concentrically arranged bellows defining a ring shaped expandable chamber therebetween.
- 36** This subclass is indented under subclass 34. Apparatus including a second expandable chamber device other than a bellows type.
- 37** This subclass is indented under subclass 34. Apparatus comprising two or more bellows type expandable chamber devices.
- 38** This subclass is indented under subclass 37. Apparatus in which the plural bellows expandable chambers are provided with passage means establishing communication between the chambers formed by the several bellows, and including a body of nonworking liquid contained within said bellows chambers such that contraction of one of the bellows will cause such liquid to flow into a second bellows to thereby cause expansion of such second bellows.
- 39** This subclass is indented under subclass 37. Apparatus in which the several bellows type expandable chambers are provided with a wall secured to adjacent ends of the chambers to form a closure wall for each of said chambers, said wall being movable responsive to expansion or contraction of either chamber.
- 40** This subclass is indented under subclass 34. Apparatus including a separate means other than the working fluid associated with the bellows type expandable chamber for continuously exerting a force in one direction of movement of said bellows type expandable chamber.
- (1) Note. The separate means as set forth in this definition does not include the inherent resiliency of the material forming the bellows, but must include a separate member (e.g., spring) which member may be secured to or embedded in the wall of the bellows.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
94, for a separate biasing means for a flexible wall type working member.
- 130+, and the search there noted, for a separate biasing means for a working member.
- 41** This subclass is indented under subclass 34. Apparatus including means designed to subdue vibrations incurred in the bellows type expandable chamber wall during expansion or contraction of such bellows.
- (1) Note. A mere spring designed to bias the bellows in one position of its movement is excluded.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
40, for a spring biasing means for a bellows expandable chamber device.
- 42** This subclass is indented under subclass 34. Apparatus including a ring-like member positioned to abut against the bellows type expandable chamber wall at the apex of a pleat thereof, said ring-like member forming a means for restraining radial movement of said pleat portion.
- 43** This subclass is indented under subclass 34. Apparatus including means associated with the bellows type expandable chamber wall and axially movable therewith, said means being engageable with a fixed member lying in the path of travel of the bellows type expandable chamber wall to arrest movement of said bellows type expandable chamber wall after a predetermined extent of axial movement thereof.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
13.2, for an adjustable means for limiting axial movement of a flexible wall type working member to vary the stroke of said working member.
- 44** This subclass is indented under subclass 34. Apparatus including a rigid member extending parallel to the longitudinal axis of the bellows type expandable chamber device, said bellows type expandable chamber device having a portion thereof slidably engaged with said rigid member, said member functioning to constrain said bellows device to a path of travel extending parallel to the longitudinal axis thereof.

- 45** This subclass is indented under subclass 34. Apparatus in which the pleated portion includes a pair of superposed ring shaped elements having the inner peripheral portion thereof secured together.
- 46** This subclass is indented under subclass 45. Apparatus in which a portion of the ring shaped elements or the means forming the connection between the elements include a nonmetallic material.
- 47** This subclass is indented under subclass 34. Apparatus in which the bellows wall is formed of (1) two or more different materials, (2) a single material which has been treated to provide portions of the bellows wall with specific properties which are different from the properties of another portion thereof or (3) claimed as of a specific material.
- (1) Note. In part (3) the mere recitation that the bellows wall is formed, for example, of “flexible material”, “rubber”, “leather” or “plastic” is not considered as specific material and is excluded from this subclass. However, specifying a kind of rubber, or plastic is considered a recitation of a specific material for this subclass.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
103, for a flexible diaphragm type working member of specific or diverse material.
- 48** This subclass is indented under the class definition. Apparatus comprising two or more working members, each of said working members having a portion of the wall thereof formed of material which is pliable, and in which the flexing of said pliable material constitutes the movement of said working member.
- (1) Note. A device comprising plural axially spaced flexible wall members having working surface areas of the same size and forming the sole means for dividing an encompassing housing into separate working chambers, and in which movement of one flexible wall member is transmitted to the second flexible wall members as a result of having said flexible wall members in face to face contact, or spaced with an interposed rigid element, or body of incompressible fluid to form in effect a single diaphragm is excluded from this definition.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
37+, for plural flexible wall working members of the bellows type.
97, for a flexible diaphragm comprising a pair of axially spaced flexible walls provided with a noncompressible force transmitting means therebetween.
103, for a flexible wall working member formed of a plurality of superposed laminae of flexible material.
- SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 263+ for a volume or rate of flow meter of the diaphragm or collapsible chamber wall type having a plurality of diaphragms, and subclasses 716+ for a fluid pressure gauge including plural and/or differential diaphragms.
- 49** This subclass is indented under subclass 48. Apparatus in which each working member comprises a relatively thin membrane like member peripherally secured to an encompassing tubular structure and extending inwardly from said peripherally secured edge portion forming a partition for said tubular structure, and in which the surface area of one working member adapted to contact the working fluid is larger than the working fluid contacting surface area of a second of said working members.
- SEE OR SEARCH CLASS:
73, Measuring and Testing, subclasses 716+ for an expansible chamber type fluid pressure gage having plural, differential diaphragms.
- 50** This subclass is indented under subclass 48. Apparatus in which the working members form opposite walls of a chamber which is adapted to contain the working fluid, said working members being movable toward and away from each other during the contraction and expansion of the expansible chamber device.

- (1) Note. A unitary bag-like flexible wall working member is excluded from this subclass, such subject matter is classified below as indicated in the Search Notes.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
 69, and 75, for plural relatively movable working members of the nonflexible wall type forming opposite walls of a common chamber.
 91+, for a bag-like flexible wall working member.
- 51** This subclass is indented under the class definition. Apparatus comprising a first cylinder or elongated tubular element, a member positioned in said first cylinder or tubular element in coaxial relationship therewith, and a second cylinder for receiving said first cylinder or tubular element therein, said member sealingly engaging said first cylinder or tubular element and being axially slidable relative thereto and said second cylinder sealingly engaging said first cylinder or tubular element and being axially slidable relative thereto and to said member.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
 113, for a member slidable within a hollow piston rod, but being in nonsealing relationship therewith.
- SEE OR SEARCH CLASS:
 52, Static Structures (e.g., Buildings), subclass 115 for a fluid pressure operated relatively movable shaft assembly.
 91, Motors: Expansible Chamber Type, subclass 169 for an expansible chamber type motor in which the chamber is formed of mutually relatively movable cylinder, sleeve and piston.
- 52** This subclass is indented under subclass 51. Apparatus in which said first cylinder or tubular element is so arranged in the device as to constitute a working member.
- 53** This subclass is indented under subclass 51. Apparatus including an additional cylinder receiving said second cylinder therein in coaxial relationship, said second cylinder sealingly engaging said additional cylinder and being axially slidable relative thereto.
- 54** This subclass is indented under the class definition. Apparatus comprising a cylinder having a piston therein, said cylinder being mounted on a fixed supporting structure for movement during operation relative thereto in a circular path of more than 360 degrees about an axis other than the longitudinal axis of the cylinder, said movement being responsive to or causing the expansion or contraction of the expansible chamber.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
 31+, for a cylinder which is adapted to rotate about its longitudinal axis responsive to relative axial movement of a piston therein.
- SEE OR SEARCH CLASS:
 91, Motors: Expansible Chamber Type, subclasses 196+ for an expansible chamber type motor having a moving cylinder.
 123, Internal-Combustion Engines, subclasses 43+ for an internal combustion engine having a rotating cylinder.
 417, Pumps, subclasses 462+ for an expansible chamber type pump having a cylinder which rotates about an axis other than the longitudinal axis of the cylinder.
- 55** This subclass is indented under subclass 54. Apparatus comprising a conduit for conducting fluid to or from said cylinder, the axis of said conduit coinciding with the axis of rotation of said cylinder.
- 56** This subclass is indented under subclass 54. Apparatus comprising two or more cylinders mounted for movement about said axis.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
 12.1+, for plural cylinders arranged in parallel, radial, or conical relationship with a rotary transmission axis with means to adjust the working chamber displacement thereof.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclasses 472+ for an expansible chamber type motor having three or more cylinders arranged in parallel, radial, or conical relationship with a rotary transmission axis.
- 417, Pumps, subclasses 269+ for an expansible chamber type pump having three or more cylinders arranged in parallel, radial, or conical relationship with a rotary transmission axis.

- 57** This subclass is indented under subclass 56. Apparatus in which the several cylinders are positioned with the axes thereof parallel to each other and in which the axis of the circular path extends in a direction parallel to the axes of the several cylinders.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 12.2, for plural cylinders arranged in parallel relationship with a rotary transmission axis and having means to adjust the working chamber displacement thereof.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclasses 499+ for expansible chamber type motors having three or more cylinders arranged in parallel relationship with a rotary transmission axis.
- 417, Pumps, subclass 269 for expansible chamber type pumps having three or more cylinders arranged in parallel relationship with a rotary transmission axis.

- 58** This subclass is indented under subclass 56. Apparatus in which the several cylinders are so positioned relative to each other as to have the axes thereof intersect at a point on said axis.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 12.1, for plural cylinders arranged in radial or conical relationship with a rotary transmission axis and having means to adjust the working chamber displacement thereof.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclasses 491+ for expansible chamber type motors having three or more cylinders arranged in radial relationship with a rotary transmission axis.
- 123, Internal-Combustion Engines, subclass 44 for an internal combustion engine having a plurality of radially disposed rotating cylinders.
- 417, Pumps, subclass 273 for expansible chamber type pumps having three or more cylinders arranged in radial relationship with a rotary transmission axis.

- 58.1** This subclass is indented under the class definition. Apparatus in which either (1) the expansible chamber device or power transmission portion thereof is adapted to be rearranged for storage purposes or (2) the expansible chamber device is provided with a conduit for conducting working fluid to or from the chamber and means to return the conduit to or retain the conduit in a nonuse or stored position.

- (1) Note. The mere movement of a power transmission element (e.g., handle) to an extreme nonuse position is excluded under this definition. However, a power transmission having features provided for the express purpose of allowing compact storage (e.g., sectionally hinged or telescoping portions of an operating lever or means for permitting ease of disassembly of an operating lever) is considered proper subject matter under this definition.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 355.16+ for apparatus for storing or retrieving a flexible conduit which is not combined with a claimed expansible chamber device.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 195+ for apparatus having a flexible conduit and terminal member and means for returning or retaining the flexible conduit or terminal member. Also, see section III (b) of the Class 239 definition for a state-

ment regarding various related sub-combinations.

- 59** This subclass is indented under the class definition. Apparatus (A) adapted to be rearranged to perform a different function or (B) adapted to be altered so as to operate in a different way or change its function in some way by (1) disassembling the device in some major portion and then reassembling the device with the same or different portion, (2) disassembling some major portion from the device, or (3) assembling some major portion to the device.

- (1) Note. A mere adjustment of some part of the expansible chamber device, such as for example, an adjustable spring used to bias a working member in a direction of its movement, or a radially adjustable piston side wall portion is excluded from this definition, such features being classified below.
- (2) Note. A portion of an expansible chamber device, such as for example a working chamber liner which is adapted to be reversed, replaced, removed or added to present a new working member engaging surface but which does not change the mode of operation of the expansible chamber device is excluded from this subclass, however where such change effects a change in the size or shape of the expansible chamber device, classification is in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 6, for an expansible chamber device in which the effective area of the working member end face is selectively variable.
- 13.41, for adjusting working member stroke by assembly or disassembly of a portion of the device.
- 128, for an expansible chamber device provided with special means, or so constructed as to facilitate the assembly or disassembly thereof.
- 133, and the search there noted for an adjustable spring device for biasing a working member in one direction of its movement.

169+, for a replaceable or reversible cylinder liner.

201+, for a piston having a radially adjustable side wall portion and especially subclass 204 for means to adjust the side wall portion radially comprising a shim element which may be selectively inserted or removed from between relatively movable piston portions.

- 60** This subclass is indented under the class definition. Apparatus including a movable wall for the expansible chamber device other than a working member positioned to be in constant open communication with the working chamber, said movable wall being either (1) made of resilient flexible material or (2) urged in one direction by means of a spring device.

- 60.5** This subclass is indented under the class definition. Apparatus comprising selectively adjustable means to change the volume of the expansive chamber remaining after the working member has reached the limit of its movement in a chamber decreasing direction, said means not involving a mere stroke of the working member.

- (1) Note. The adjustment usually involves a selective movement of a chamber wall or the opening or closing of a valve between the expansible chamber and a blind chamber, i.e., clearance chamber.
- (2) Note. This definition excludes an expansible chamber pump or motor having a valved clearance chamber in which the valve is controlled in response to a pump or motor condition. Such pump or motor is classified in the appropriate pump or motor class.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 13+, for means to adjust the stroke of a working member or the end limits of the stroke of a working member relative to the chamber.
- 60, for a flexible or resiliently biased non-working member wall in constant communication with the working chamber.

SEE OR SEARCH CLASS:

- 123, Internal-Combustion Engines, subclass 48, for internal combustion engines having clearance control means which is responsive to an engine condition.
- 417, Pumps, subclasses 274+ for pumps having clearance control means which is responsive to a pump condition.

61 This subclass is indented under the class definition. Apparatus comprising two or more working members which are movably related to each other.

- (1) Note. A fluid responsive element which is movable relative to the working member, of an expansible chamber device and which is utilized to perform work solely for use by a part of the expansible chamber device, such as for example, to adjust a part of the working member, or to effect a seal or a lubricating means between expansible chamber device parts is not considered as a working member movable relative to the working member of the expansible chamber device being acted upon or modified by such element, and is excluded from this subclass. Such structure is classified below on other features.
- (2) Note. Class 92 excludes multiple expansion type motors and multistage pumps even if no valving is claimed if the claims do include the fluid connection between stages of the motor or pump.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 2, for relatively movable working members which reciprocate and rotate a common power transmission element.
- 28+, and the search there noted, for a working member which is movable relative to a second working member and which operates a latch or lock to secure said second working member against movement.
- 37+, for plural bellows type expansible chamber devices in which the several bellows are movable relative to each other.

48+, for plural flexible wall working members in which the several flexible wall working members are movable relative to each other.

52, for relatively movable concentric working members.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclasses 152+ for multiple expansion type motors, subclasses 170+ for an expansible chamber type motor, having relatively movable working members with one controlled by, movably interconnected with or moved by another; subclasses 508+ for an expansible chamber type motor having plural working members.
- 123, Internal-Combustion Engines, subclass 51 for an internal combustion engine having a plurality of pistons.
- 417, Pumps, subclasses 244+ for pumps having successive stages.

62 This subclass is indented under subclass 61. Apparatus comprising a first working member movable along a path, and a second working member coaxial therewith, means on said first working member normally free of force transmitting engagement with said second working member at some point along the path of travel of said first working member and adapted to contact and move said second working member at some other point along the path of travel of said first working member.

63 This subclass is indented under subclass 62. Apparatus including a separate means other than the working fluid associated with at least one of the working members for continuously exerting a force in one direction of movement of said working member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

130+, and the search there noted, for a separate biasing means for a working member.

64 This subclass is indented under subclass 61. Apparatus in which one of said working members has at least a portion of the wall thereof formed of material which is pliable, and in

which the flexing of said pliable material constitutes the movement of said working member.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 36, for a bellows type expansible chamber device combined with a nonbellows type expansible chamber device.
- 48+, for plural flexible wall working members.

65 This subclass is indented under subclass 61. Apparatus comprising a first working member provided with a rigid stem extending axially therefrom, and a second working member provided with an opening extending axially there-through, said rigid stem on said first working member extending slidably through said opening as said working members move relative to each other.

66 This subclass is indented under subclass 61. Apparatus in which (1) the relatively movable working members comprise movably mounted cylinders or (2) the relatively movable working members are disposed in movably mounted cylinders.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 56+, for a plurality of cylinders which rotate during relative reciprocatory movement of said cylinders and pistons positioned therein.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclass 176 for relatively movable working members including moving cylinders provided with fluid control means.
- 417, Pumps, subclass 467 for expansible chamber type pumps having plural relatively movable cylinders.

67 This subclass is indented under subclass 61. Apparatus in which the working members are of the type which move back and forth in an arcuate path within a working chamber to effect expansion or contraction of the expansible chamber, the travel of said working members in one direction of said arcuate path being limited to no more than 360 degrees.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 66, for a plurality of reciprocating working members which are positioned in movable cylinders which are mounted for oscillatory movement in an arcuate path of not more than 360 degrees.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclass 177 for relatively movable oscillating working members provided with fluid control means.

68 This subclass is indented under subclass 61. Apparatus including a shaft mounted for rotation, and a means (e.g., linkage or gearing) interconnecting said shaft and the working members so that rotation of the shaft effects reciprocatory motion of the working members, or reciprocatory movement of the working members effects rotation of the shaft.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 12.1+, for plural cylinders arranged in parallel, radial, or conical relationship with a rotary transmission axis with means to adjust the working chamber displacement thereof.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, appropriate subclasses for mechanisms for converting one type of motion into another, and particularly subclasses 25+ for mechanisms for converting reciprocating movement to or from rotary, and subclasses 640+ for means for converting one type of motion to another involving gearing. Class 74 takes nominally recited pistons and cylinders combined with a mechanical motion converting linkage or gearing mechanism. For a further explanation of the line between Class 74 and Class 92, see References to Other Classes of the class definition.
- 91, Motors: Expansible Chamber Type, subclasses 472+ for an expansible chamber type motor having three or more cylinders arranged in parallel,

- radial, or conical relationship with a rotary transmission axis.
- 417, Pumps, subclasses 269+ for an expansible chamber type pump having three or more cylinders arranged in parallel, radial, or conical relationship with a rotary transmission axis.
- 475, Planetary Gear Transmission Systems or Components, for planetary gearing in a motion converting drive train.
- 69** This subclass is indented under subclass 68. Apparatus in which the working members form opposite walls of a chamber which is adapted to receive the working fluid, said working members being movable toward and away from each other during the contraction and expansion of the expansible chamber.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 75, for relatively movable working members forming opposite walls of a common chamber.
- 70** This subclass is indented under subclass 69. Apparatus in which the axes of the working members are coaxial or parallel to each other and the axis of the shaft is parallel to the axes of the working members.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 71, for relatively movable working members interconnected with a common rotatable shaft having the axis thereof extending in a direction parallel to the axes of the working members.
- SEE OR SEARCH CLASS:
- 91, Motors: Expansible Chamber Type, subclass 501 for expansible chamber type motors having three or more cylinder arranged in parallel relationship with a rotary transmission axis in which the cylinders contain plural oppositely movable pistons.
- 71** This subclass is indented under subclass 68. Apparatus in which the axes of the working members are parallel to each other, and the axis of the shaft is parallel to the axes of the working members.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 70, for relatively movable working members forming oppositely movable walls of a common chamber and being interconnected by a common rotatable shaft having the axis thereof extending parallel to the axes of the working members. Note the class definition, Statement Relating To Placement Of Patents Involving Combination And Subcombination Subclasses, and the paragraph following the title in the schedule of this class.
- SEE OR SEARCH CLASS:
- 91, Motors: Expansible Chamber Type, subclasses 499+ for expansible chamber type motors having three or more cylinders arranged in parallel relationship with a rotary transmission axis.
- 417, Pumps, subclass 269 for expansible chamber type pumps having three or more cylinders arranged in parallel relationship with a rotary transmission axis.
- 72** This subclass is indented under subclass 68. Apparatus in which the axis of the rotary shaft extends transversely to the direction of movement of the working members, and the longitudinal axes of the working members intersect the axis of the shaft.
- SEE OR SEARCH CLASS:
- 91, Motors: Expansible Chamber Type, subclasses 491+ for expansible chamber type motors having three or more cylinders arranged in radial relationship with a rotary transmission axis.
- 417, Pumps, subclass 273 for expansible chamber type pumps having three or more cylinders arranged in radial relationship with a rotary transmission axis.
- 73** This subclass is indented under subclass 72. Apparatus in which the working members are so arranged relative to each other that the longitudinal axes of the various working members are parallel.

74 This subclass is indented under subclass 73. Apparatus in which each of the relatively movable working members is provided with an opening extending therethrough in a direction perpendicular to the direction of a movement of the working member, and the shaft extends through the opening in each of the working members.

75 This subclass is indented under subclass 61. Apparatus in which the working members form opposite walls of a chamber which is adapted to receive the working fluid, said working members being movable toward and away from each other during the contraction and expansion of the expansible chamber.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

50, for a plurality of oppositely movable flexible wall working members positioned in a common chamber. Note the class definition, Statement Relating To Placement Of Patents Involving Combination And Subcombination Subclasses, and the paragraph following the title in the schedule of this class.

69, for oppositely moving working members in a common chamber, said working members being connected to a common rotatably mounted shaft. Note the class definition, Statement Relating To Placement Of Patents Involving Combination And Subcombination Subclasses, and the paragraph following the title in the schedule of this class.

SEE OR SEARCH CLASS:

417, Pumps, subclass 488 for an expansible chamber pump having plural pumping members forming opposite walls of a common pump chamber.

76 This subclass is indented under subclass 61. Apparatus in which the working members are interconnected by means of a mechanical motion converting linkage device having parts which are movable relative to each other.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

68+, for relatively movable working members interconnected by mechanical motion converting means including a rotating shaft.

SEE OR SEARCH CLASS:

91, Motors: Expansible Chamber Type, subclass 186 for similar structure combined with means to control the supply of motive fluid to the working members.

77 This subclass is indented under the class definition. Apparatus comprising an enclosure or casing for forming the working chamber of the expansible chamber device, said enclosure or casing being positioned within a cavity in the earth, the surrounding walls of said cavity being in contact with and forming reinforcing means for said working chamber forming enclosure or casing.

78 This subclass is indented under the class definition. Apparatus including means for separating or filtering a foreign material from a fluid which is adapted to contact a portion of the working member to enhance the operation of some portion of the expansible chamber device (e.g., working fluid or lubricant).

(1) Note. Included under this definition are means for removing a gaseous fluid from a hydraulic fluid, including means for bleeding or venting a space designed to receive a liquid, but which may have become filled with a gaseous fluid.

(2) Note. Class 96 or Class 210 which are directed to fluid purification take a fluid purification means (e.g., filter) when claimed, per se, or in combination with an enclosure even though disclosed as a cylinder or working chamber for an expansible chamber device, regardless of the disclosed use of such means. Class 96 or Class 210 also take the combination of an expansible chamber device of the type set forth in the class definition of the class (92), (A)(1), combined with detailed means to purify the working fluid thereof positioned either upstream

or downstream of the expansible chamber device unless there is a specific disclosure that such purification is for the purpose of protecting some portion of the expansible chamber device.

Class 92 takes the combination of an expansible chamber device with a specific fluid purification means where such purification means is specifically disclosed as protecting some portion of the expansible chamber device. Class 92 also takes the combination of an expansible chamber device and a nominally recited purification means regardless of the disclosed purpose of such means. Recitations such as “a filter”, “a filter in the inlet line”, “a filter adjacent a port or opening” are considered nominal recitations of a purification means and patents containing such recitations are classified in Class 92 regardless of the disclosed purpose of such means.

- (3) Note. The combination of an expansible chamber device of the type set forth in the Class Definition of this class (92) section (A)(1), with a nominally recited working fluid purifying means of the type which constitutes subject matter for Class 96 or Class 210 as set forth in (2) Note is excluded from this subclass. For the purpose of classification in Class 92, the nominal purifying means will be ignored and classification will be on other features with cross-referencing in appropriate subclasses in Class 96 or Class 210.

SEE OR SEARCH CLASS:

- 96, Gas Separation: Apparatus, for apparatus for gas separation. (See (2) Note and (3) Note above.)
- 123, Internal-Combustion Engines, subclass 41.86 for crankcase ventilation of an internal combustion engine, including fluid purifying means.
- 210, Liquid Purification or Separation, appropriate subclasses for means for separating from a liquid of any character of material.
- 220, Receptacles, subclass 366.1 and 367.1+ for a vented closure for a container in which the vented closure

may include filtering means. Class 220 takes a nominally recited cylinder, crankcase or engine block provided with a specific vented closure including filtering means.

- 79** This subclass is indented under subclass 78. Apparatus in which the fluid is a liquid and the separating or filtering means is adapted to remove a gaseous fluid entrained in said liquid.

- (1) Note. This subclass includes means for venting or bleeding a gaseous fluid from a space designed to contain a liquid.

SEE OR SEARCH CLASS:

- 96, Gas Separation: Apparatus, subclasses 155+ for degasifying means for liquid.
- 137, Fluid Handling, subclasses 171+ for a fluid separating trap or vent.

- 80** This subclass is indented under the class definition. Apparatus including means such as a pump for exerting a force upon a fluid to remove such fluid from a space in the expansible chamber device, other than the working chamber.

SEE OR SEARCH CLASS:

- 60, Power Plants, subclasses 325+ for a pump in communication with the working chamber of an expansible chamber device where the pump is more than nominally claimed. Class 60 takes such combination even though the pump is disclosed for the purpose of draining condensation or other extraneous fluid from the working chamber.
- 123, Internal-Combustion Engines, subclass 41.86 for crankcase ventilation for an internal combustion engine, including pump means to force fluid from the crankcase.

- 81** This subclass is indented under the class definition. Apparatus comprising a working member having a chamber formed therein, said chamber being in open communication with the working chamber through a restricted opening in said working member end face and forming a storage space for a noncompressible liquid type working fluid, said noncompressible

working fluid being effective to move said working member upon being exhausted from said working member chamber to said working chamber through said restricted opening.

- 82** This subclass is indented under the class definition. Apparatus comprising a passage communicating with a space in the expansible chamber device other than the space which forms the working chamber, and valve means for said passage to control the egress of fluid from said space.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 8, for a means to control the flow of non-working arresting fluid for a working member.
80, for force exerting means to move fluid from a nonworking chamber.

SEE OR SEARCH CLASS:

- 123, Internal-Combustion Engines, subclass 41.86 for crankcase ventilation of an internal combustion engine, including valve means to control the flow of fluid from the crankcase.
220, Receptacles, subclass 44 for a vented closure for a container in which the closure includes a valve. Class 220 takes a nominally recited cylinder crankcase or engine block provided with a specific vented closure which includes a valve means.

- 83** This subclass is indented under the class definition. Apparatus in which a portion of the expansible chamber device is provided with a space which contains a body of nonworking liquid, the working member being provided with a portion which extends into said liquid at all positions of movement of said working member to form a seal between the working chamber and a nonworking chamber space.

- 84** This subclass is indented under the class definition. Apparatus comprising a working member and a power transmission member movable with respect thereto, a resilient device interposed between and in engagement with said members, said members being so related that movement of one of said members is effective to move said other member by means of said resilient element.

- (1) Note. A mere resilient piston side wall portion which forms a seal means for the piston positioned between an end face portion and a second piston portion such that movement of said end face portion toward said second portion effects radial movement of said resilient portion is excluded from this definition. Such subject matter is classified below on other features.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 130+, and the search there noted, for a separate biasing means for a working member.
193+, for a resilient piston side wall portion interposed between a piston end face portion and a relatively axially movable other portion, and spring means for biasing said end face portion and other portion toward each other to effect radial movement of the resilient side wall portion.
205+, for a resilient piston side wall portion interposed between an end face portion and another piston portion in which relative axial adjustment of said end face portion and other portion effects radial movement of the resilient side wall portion.
247, for a resilient piston side wall portion interposed between an end face portion and another relatively axially movable other piston portion in which fluid pressure responsive axial movement of the end face portion effects radial movement of the resilient side wall portion.

SEE OR SEARCH CLASS:

- 251, Valves and Valve Actuation, subclass 63.4 for an expansible chamber valve actuator having a resilient means interposed between the actuator and a relatively movable valve.

- 85** This subclass is indented under the class definition. Apparatus including means operable for a portion only of the stroke of the working member, said means being effective to cushion the movement of such working member over the portion of the stroke in which it is effective.

- (1) Note. A device (e.g., spring) which is effective over the entire stroke of the working member to urge the working member in one direction of its movement is excluded from this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 7, for an overcenter means to bias a working member in opposite directions over different portions of the stroke.
- 8+, for a movement damping means including a flowing body of fluid in which means are provided to control the flow of the fluid.
- 41, for a vibration damping means for a bellows type expansible chamber.
- 84, for a resilient element interposed between a working member and a relatively movable power transmission element.
- 130+, and the subclasses there noted, for a means for biasing a working member over the entire stroke.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclasses 392+ for a working member stroke end cushioning means effected by control of the motive fluid.

86 This subclass is indented under the class definition. Apparatus including a passage means communicating with a space in the expansible chamber device which is intended to form a receiver for liquid which escapes from the working chamber, said conduit forming a means for allowing escape of such liquid from said space.

86.5 This subclass is indented under the class definition. Apparatus in which the working chamber is defined by a cylinder having a port or passage formed therein which terminates in an opening on an interior longitudinal wall portion of the cylinder which is adapted to be traversed by the working member, said passage or port being provided for the purpose of allowing entry of a nonworking fluid (e.g., sealant or lubricant) to the area of cylinder and working member interengagement.

87 This subclass is indented under the class definition. Apparatus including means for scraping, dissolving or otherwise removing foreign matter from a part of an expansible chamber device, said means being in nonsealing relationship with said part of the expansible chamber device from which such foreign matter is being removed.

88 This subclass is indented under the class definition. Apparatus comprising an elongated chamber for receiving a reciprocating working member, the longitudinal wall of said chamber being provided with an elongated opening extending between the ends of the chamber through which a portion of the working member is adapted to protrude and means cooperating with said chamber wall adjacent the opening to seal the opening adjacent said protruding portion.

89 This subclass is indented under the class definition. Apparatus comprising a wall portion of an expansible chamber, said wall portion being formed of flexible material or rigid members hinged or interfitted together so that the members are movable relative to each other; the flexing of the material or the relative movement of the members constituting the movement which effects the work function of the expansible chamber.

- (1) Note. As to portion (1) of this definition the sheet of flexible material must be disclosed as of the type which flexes or is distorted to cause expansion of the expansible chamber. A member formed of flexible material such as a flexible material piston which is disclosed as being slidable in a chamber to cause expansion of the chamber is excluded. Such devices are classified below on other features.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 34+, for a bellows type expansible chamber wall.
- 48+, for plural flexible wall working members.
- 64, for plural relatively movable working members in which one of said work-

ing members is of the flexible wall type.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 262+ for a collapsible chamber type fluid volume or rate of flow meter.

90 This subclass is indented under subclass 89. Apparatus in which the wall portion is formed of flexible material.

SEE OR SEARCH THIS CLASS, SUBCLASS:

34+, for a bellows type expansible chamber portion formed of flexible material.
48+, for plural flexible wall working members.
64, for plural relatively movable working members in which one of said working members is of the flexible wall type.

SEE OR SEARCH CLASS:

73, Measuring and Testing, subclasses 262+ for a flexible wall type, expansible chamber volume or rate of flow meter, and subclasses 715+ for a flexible wall type fluid pressure gauge.
74, Machine Element or Mechanism, subclasses 18+ for a flexible wall type sealing element attached to a relatively movable rod and casing.
222, Dispensing, subclasses 206+ for a resilient wall type dispenser.
417, Pumps, subclass 474 for an expansible chamber type pump having a progressively deformed elongated flexible wall.

91 This subclass is indented under subclass 90. Apparatus comprising a bulb, bag, box or other container like enclosure formed of flexible material, said enclosure being provided with a relatively small opening in a wall thereof through which working fluid may be admitted to or exhausted from the enclosure.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 150 for a flow starting means for a siphon, comprising a collapsible bulb.
604, Surgery, subclasses 212+ for a pump or squeeze bulb type syringe. For a

discussion of the line between Class 92 and Class 604, see section III of the class definition (92).

92 This subclass is indented under subclass 91. Apparatus in which the box, bag or bulb member is formed of nonmetallic material.

SEE OR SEARCH CLASS:

138, Pipes and Tubular Conduits, subclass 30 for a pressure compensator comprising a flexible bag member, adapted to expand and contract responsive to pressure surges.

93 This subclass is indented under subclass 90. Apparatus comprising a pair of concentric rigid members, said members being fixed with respect to each other and being radially spaced from each other to provide a ring shaped space therebetween and a ring shaped flexible wall portion spanning said space and having the inner periphery thereof in sealing engagement with the inner member and the outer periphery thereof in sealing engagement with the outer member.

94 This subclass is indented under subclass 90. Apparatus including a separate means other than the working fluid associated with the flexible wall portion for continuously exerting a force in one direction of movement of said flexible wall portion.

(1) Note. The separate means as set forth in this definition does not include the inherent resiliency of the material forming the flexible wall portion, but must be a separate member (e.g., spring).

SEE OR SEARCH THIS CLASS, SUBCLASS:

40, for a separate biasing means for a bellows type working member.
130+, and the search there noted, for a separate biasing means for a working member.

SEE OR SEARCH CLASS:

251, Valves and Valve Actuation, subclass 61.3, 61.4 and 61.5 for a flexible wall expansible chamber valve actuator and valve which is provided with

spring means for biasing the flexible wall.

- 95** This subclass is indented under subclass 94. Apparatus in which the force exerted by the means may be selectively increased or decreased so that the force exerted on the flexible wall portion by the means can be varied.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 133, for an adjustable separate biasing means for a working member.

- 96** This subclass is indented under subclass 90. Apparatus comprising a relatively thin membrane-like member having a peripheral edge portion, said member being adapted to be associated with a surrounding or encompassing tubular rigid structure to extend transversely thereof to form a closing wall for said tubular structure, the outer peripheral edge of said membrane being in sealing relationship with the encompassing wall of said tubular structure.

- (1) Note. The membrane-like member need not span the entire space within the encompassing wall of the tubular member, but may be in the form of a ring or frustum having the inner peripheral edge thereof in sealing engagement with a rigid element movable relative to and coaxial with the encompassing tubular member.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 269+ for a diaphragm type, expansible chamber volume or rate of flow meter, subclasses 279+ for a diaphragm for an expansible chamber type volume or rate of flow meter, and subclasses 715+ for a diaphragm for a fluid pressure gauge.
- 137, Fluid Handling, subclass 315.05 for a fluid handling system with repair, tapping, assembly, or disassembly means for a diaphragm type pressure regulator, pressure-regulating valve or reducing valve, subclass 315.07 for a fluid handling system with means to assemble or disassemble a compressible tube or diaphragm type valve,

subclass 510 for a line condition change responsive valve having a separate connected fluid reactor surface in which the reactor surface is a diaphragm, or subclasses 843-860 for a direct response line condition change responsive valve formed of resilient material.

- 138, Pipes and Tubular Conduits, subclasses 30+ for a variable capacity chamber including a diaphragm member forming a yieldable wall for the chamber.
- 251, Valves and Valve Actuation, subclasses 61+ for a valve having a flexible material wall expansible chamber reciprocating valve actuator.
- 285, Pipe Joints or Couplings, subclass 225 for a diaphragm type flexible joint between rigid members.

- 97** This subclass is indented under subclass 96. Apparatus in which the diaphragm comprises two or more relatively thin membranes positioned with one member overlying and spaced from the other member, and means comprising a rigid element or an incompressible fluid positioned between said members, so that movement of one member is transmitted to said other member through said rigid element or incompressible fluid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 49, for a plurality of flexible wall working members of the diaphragm type in which the diaphragms have different working fluid contacting areas.

SEE OR SEARCH CLASS:

- 181, Acoustics, subclasses 157+ for a diaphragm for an acoustical device.

- 98** This subclass is indented under subclass 96. Apparatus in which the periphery of the diaphragm is directly secured along all of its length against motion in any direction to the wall of a rigid structure which forms the working chamber for the diaphragm.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclass 278 for a diaphragm mounting means for a diaphragm used in an expansible

- chamber type volume or rate of flow meter.
- 181, Acoustics, subclasses 148+ and 157+ for a diaphragm and mounting therefor for an acoustical device.
- 99** This subclass is indented under subclass 98. Apparatus including a rigid member spaced from the wall of the working chamber and coaxial with such working chamber, said rigid member being secured to a portion of the diaphragm lying inwardly of the peripheral edge thereof.
- 100** This subclass is indented under subclass 99. Apparatus in which said rigid member includes a pair of plate-like members of the same area, said plate-like members being positioned on opposite sides of the diaphragm.
- 101** This subclass is indented under subclass 98. Apparatus comprising a rigid power transmission element positioned within the working chamber, said element being unsecured to the diaphragm (i.e., capable of movement with respect thereto) and adapted to be abutted thereby.
- 102** This subclass is indented under subclass 98. Apparatus in which a separate sealing gasket is interposed between the peripheral portion of the diaphragm and the rigid structure.
- 103** This subclass is indented under subclass 96. Apparatus in which the diaphragm is formed of (1) two or more different materials, (2) a single material which has been treated to provide portions of the diaphragm with specific properties which are different from the properties of another portion thereof or (3) claimed as of a specific material.
- (1) Note. In part (3) the mere recitation that the diaphragm is formed for example of "flexible material", "rubber", "leather" or "plastic" is not considered a recitation of a specific material and is excluded from this subclass. However, specifying a kind of rubber or plastic is considered specific material for this subclass.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 47, for a bellows type expansible chamber portion formed of a specific or diverse material. Note the Class Definition, Statement Relating To Placement Of Patents Involving Combination And Subcombination Subclasses, and the paragraph following the title in the schedule of this class.
- SEE OR SEARCH CLASS:
- 428, Stock Material or Miscellaneous Articles, appropriate subclasses for a stock material product in the form of a single or plural layer web or sheet which may be nominally claimed as a diaphragm, or which may be described as, or for use as, a diaphragm. Class 428 takes a named diaphragm where the claim is directed to no more than a single or plural layer stock material provided for therein.
- 442, Fabric (Woven, Knitted, or Non-woven Textile or Cloth, etc.), subclasses 59+ for fabric which is coated or impregnated and subclasses 181+ for a woven fabric which may be bonded to a second component.
- 104** This subclass is indented under subclass 96. Apparatus in which the working fluid contacting face of the diaphragm is provided with an embossment formed by having a portion of the material thereof deformed out of the plane of said face.
- 105** This subclass is indented under subclass 90. Apparatus comprising a rigid tubular member, a second rigid member movable relative to said tubular member positioned within said tubular member with the axis thereof coinciding with the axis of said tubular member, said members being laterally spaced from each other defining a ring shaped space therebetween, the flexible wall portion spanning said space for the full peripheral extent thereof and being sealingly secured to said two members.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 93, for a ring shaped flexible wall portion joining a pair of relatively fixed rigid concentric members.
- 99+, for a diaphragm type flexible wall portion joining a pair of relatively movable rigid concentric members.
- 106** This subclass is indented under the class definition. Apparatus comprising a working chamber having a fluid conduit connected thereto, said working chamber being rotatable about its longitudinal axis relative to said fluid conduit, the connection between said working chamber and fluid conduit being so arranged as to allow constant communication between said conduit and working chamber, irrespective of the position of said working chamber relative to said conduit.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 119, for a pivotally mounted moving cylinder in which a fluid conduit extends through the pivoted connection.
- 107** This subclass is indented under the class definition. Apparatus comprising (1) a ring shaped working member provided with sealing portions along its inner and outer periphery for sealingly engaging the spaced walls of a chamber formed between a pair of fixed concentric members in which the ring shaped working member is slidably disposed or (2) a longitudinally extending chamber for receiving a ring shaped working member comprising a pair of relatively fixed concentric members said members being spaced from each other to provide a space therebetween.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 33, for an annular working member having a coaxial element extending there-through and mounted for relative rotary movement responsive to reciprocatory movement of the working member.
- 52, for mutually relatively movable cylinder or sleeve, member slidable therein and outer cylinder therefor, in which the cylinder or sleeve is an annular working member.
- 93, for an annular flexible wall working member peripherally sealed to spaced relatively fixed concentric rigid members.
- 108** This subclass is indented under subclass 107. Apparatus in which the ring shaped working member is provided with an elongated portion extending in a direction parallel to the longitudinal axis of the ring, said portion being hollow and the dimension of the outer peripheral portion thereof being less than the dimension of the outer peripheral portion of the working member end face.
- 109** This subclass is indented under the class definition. Apparatus comprising a piston provided with an elongated relatively slender tubular element extending axially therefrom and immovably secured thereto.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 108, for a ring shaped piston provided with a rigid axially extending hollow stem.
- 110** This subclass is indented under subclass 109. Apparatus in which the tubular element forms a conduit or passage through which a fluid is conducted.
- SEE OR SEARCH CLASS:
- 91, Motors: Expansible Chamber Type, subclasses 376+ for a hollow piston rod provided with a valve within said hollow rod.
- 417, Pumps, subclass 486 for an expansible chamber type pump having a fluid conduit rigidly fixed to the piston, and see the search note therein.
- 111** This subclass is indented under subclass 110. Apparatus in which the tubular element includes two or more separate and distinct passages spaced from each other in a direction perpendicular to the direction of the piston axis.
- 112** This subclass is indented under subclass 110. Apparatus in which the piston is provided with a port opening through a side wall portion thereof, and said port is in open communication with the passage in the tubular element.

- 113** This subclass is indented under subclass 109. Apparatus including an elongated member which is movable relative to the piston, at least a portion of said member being positioned within the tubular element.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 65, for a working member provided with a hollow axially extending hollow rod, and a second working member having a portion thereon adapted to extend axially through said hollow rod and being movable relative thereto.
- 108, for a ring shaped piston provided with a rigid axially extending hollow stem, in which the stem moves relative to a portion forming the working chamber for the ring shaped piston which portion extends axially through the stem.
- SEE OR SEARCH CLASS:
- 91, Motors: Expansible Chamber Type, subclass 378 for a relatively movable valve element positioned within and movable relative to a hollow piston rod.
- 114** This subclass is indented under subclass 113. Apparatus in which the member may be selectively moved in the direction of the axis of the tubular element and held in different axial positions relative thereto.
- 115** This subclass is indented under subclass 114. Apparatus in which the member forms an actuator for means positioned within the body of the piston which means operates to vary the dimension of the outer peripheral portion of the piston side wall upon movement of said member relative to the tubular element.
- (1) Note. A piston in which the member is rigid with a portion of the piston forming the end face thereof is excluded from this subclass. Such structure is classified below on other features.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 206+, for a piston having a pair of axially spaced rigid members one of which forms an end face portion, and an interposed side wall portion, in which relative axial movement of said rigid members effects lateral movement of the side wall portion.
- 116** This subclass is indented under the class definition. Apparatus including an elongated member extending axially of the working member, said member being secured to the working member in such a manner as to allow rotation of said member relative to the working member, but to prevent movement of such member in a direction either parallel to or laterally of the axis of said working member.
- 117** This subclass is indented under the class definition. Apparatus comprising a cylinder adapted to slidably receive a piston therein, said cylinder being mounted for relative movement with respect to a supporting structure, movement of said cylinder relative to said supporting structure being responsive to or causing the expansion or contraction of the expansible chamber.
- (1) Note. An expansible chamber device in which it involves an obvious matter of choice or reversal of parts whether the piston is stationary and the cylinder movable or vice versa is excluded even if the claim identifies the cylinder as the movable element. In the case, however, where the cylinder, for example, is provided with a specific power transmission element, or means to guide the cylinder in a specific path, including an outer casing in which the cylinder partakes of a relative axial movement incident to expansion or contraction of the chamber, or where a specific form of mounting means is provided to allow the cylinder to move about an axis incident to the expansion or contraction of the expansible chamber, classification under this definition results.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 31+, for a cylinder which is rotatable relative to a working member slidable therein along an axis which coincides with the axis of the cylinder, incident to the rectilinear motion of the working member.

- 51+, for a cylinder movable relative to a concentric outer casing, and having a working member within such cylinder and axially movable relative to both said cylinder and casing.
- 54+, for a cylinder which moves in a circular path of more than 360 degrees incident to the expansion or contraction of the expansible chamber.
- 66, for a plurality of relatively movable cylinders forming either (1) working members or (2) working chambers for a plurality of relatively movable working members.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclasses 196+ for an expansible chamber type motor having a moving cylinder.
- 123, Internal-Combustion Engines, subclass 50 for an internal combustion engine having a reciprocating cylinder.
- 173, Tool Driving or Impacting, subclass 125 for an impacting hammer head constituted by or fixed to a drive motor cylinder.
- 417, Pumps, subclass 460 for an expansible chamber type pump having a moving cylinder.

- 118** This subclass is indented under subclass 117. Apparatus comprising means mounting the cylinder on the supporting structure for movement about a fixed axis.

- (1) Note. A cylinder pivoted to a supporting structure for the purpose of adjusting the angular relation of the cylinder relative to the supporting structure, but which does not move incident to the expansion or contraction of the expansible chamber device is excluded.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 161+, for a cylinder pivoted to a supporting structure for the purpose of adjusting the angular position of the cylinder relative to the supporting structure.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclass 241 for a volume or rate of flow meter of the expansible chamber type having a reciprocating piston movable in an oscillating cylinder.
- 91, Motors: Expansible Chamber Type, subclasses 210+ for an expansible chamber type motor having an oscillating cylinder.
- 123, Internal-Combustion Engines, subclass 42 for an internal combustion engine having an oscillating cylinder.
- 417, Pumps, subclasses 464+ for an expansible chamber type pump having a cylinder which oscillates about an axis transverse to its longitudinal axis.

- 119** This subclass is indented under subclass 118. Apparatus in which the conduit or passage means for admitting working fluid to the cylinder extends through the axis of said mounting means, so that working fluid may be admitted to said cylinder continuously irrespective of the position of the cylinder relative to the supporting structure about said axis.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclasses 211+ for an oscillating cylinder provided with a ported bearing or trunnion and valve means in said bearing or trunnion.

- 120** This subclass is indented under the class definition. Apparatus comprising (1) a working member of the type designed to move back and forth in an arcuate path of not more than 360 degrees about a fixed axis or (2) a working chamber designed to receive a working member of the type defined in section (1) of this definition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 67, for plural relatively movable oscillating working members.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 252+ for a volume or rate of flow meter of the expansible chamber type having an oscillating piston.

- 417, Pumps, subclasses 481+ for an expandible chamber type pump having oscillating pumping member.
- 121** This subclass is indented under subclass 120. Apparatus in which the working member comprises a blade-like member having a rotatably mounted shaft secured along one edge thereof for movement therewith and forming the means for transmitting mechanical power to or from said working member, the axis of said shaft forming the axis about which said blade-like member is adapted to move.
- 122** This subclass is indented under subclass 121. Apparatus comprising a second blade-like member having one edge thereof secured to the rotary shaft and extending outwardly therefrom in spaced angular relation with the other blade-like member.
- 123** This subclass is indented under subclass 121. Apparatus in which the connection between the shaft and the blade-like member provides for limited movement of the shaft relative to the blade-like member.
- 124** This subclass is indented under subclass 121. Apparatus in which the blade-like member has a portion along the periphery thereof which is movable relative to other portions of said blade-like member, and spring means associated with said blade-like member for urging said portion away from said other portions.
- 125** This subclass is indented under subclass 121. Apparatus in which the blade-like member is provided with a nonmetallic portion along the periphery thereof adapted to sealingly engage a working chamber wall portion.
- 126** This subclass is indented under the class definition. Apparatus comprising means associated with the working member for exerting a force on the working member, or a major portion thereof, in a direction transverse to the longitudinal axis of the working member to oppose a transverse force exerted on the working member during the normal functioning of the apparatus of which the working member is a part.
- (1) Note. The transverse force exerted on the working member due to the normal functioning of the apparatus is usually that due to a piston rod pivoted to the working member, the weight of the working member when operating in a horizontal cylinder or the force exerted by burning gases on a sloping face of the working member.
- 127** This subclass is indented under subclass 126. Apparatus in which said force exerting means comprises a fluid under pressure, and means are provided to direct or conduct said pressure fluid between a side wall portion of the working member and the adjacent wall of the working chamber containing said working member.
- 128** This subclass is indented under the class definition. Apparatus comprising means designed to facilitate the removal or replacement of a part of an expandible chamber device.
- (1) Note. Excluded from this subclass are devices including mere securing means for either a cylinder or piston portion, which means are so located as to be easily accessible, for example, means for securing piston parts together such as bolts which extend through the piston face for easy accessibility upon removal of a cylinder end wall is excluded. Included in this subclass are, for example, an expandible chamber device combined with a tool for disassembling or assembling a part of the device, cooperating means between a cylinder and piston for facilitating the insertion or removal of the piston from the cylinder, special openings through which a tool may be inserted to assemble or disassemble a part of the device, or specific structure of a piston having a part removable therefrom which structure is specifically disclosed as for facilitating assembling or disassembling such part from the piston without the use of separable fastening means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 59, for an expandible chamber device which is convertible or changeable by assembly or disassembly.
- 145, for the combination of an expandible chamber device combined with a tool

- for adjusting a part of the expansible chamber device.
- 216+, for an open ended hollow skirt type piston formed of separable parts, and in which the parts are secured together by means which may be easily accessible or detachable.
- 255+, for a piston formed of plural separable parts in which the parts are secured together by means which may be easily accessible or detachable.

SEE OR SEARCH CLASS:

- 29, Metal Working, subclasses 700+ for assembly or disassembly apparatus.
- 277, Seal for a Joint or Juncture, for an installation, removal, assembly, disassembly, or repair feature, subclass 421 for a close proximity labyrinth seal, subclass 435 for a piston ring, piston ring expander or seat therefor, subclass 511 for a dynamic circumferential contact seal intended for containment or compression by a gland member in a packing box, subclass 551 for a dynamic peripheral radially sealing flexible projection (e.g., lip seal, etc.) for other than a piston, subclass 598 for a static contact seal for use between parts of an internal combustion engine, or subclass 630 for a static contact seal for other than an internal combustion engine, or a pipe, conduit, or cable.

- 129** This subclass is indented under the class definition. Apparatus comprising a working member and a rigid power transmission element positioned for movement therewith, said element being unsecured to the working member (i.e., capable of movement with respect thereto) and adapted to be abutted thereby.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 51+, for a concentric arrangement of tubular members, including a working member said members being in sealed relatively sliding relationship, and in which said working member moves one of the other members through separating abutment surfaces.
- 62+, for plural coaxial relatively movable working members in which one work-

ing member is moved by a second working member through separating abutment surfaces.

- 101, for an abutment connection between a flexible diaphragm type working member and a relatively movable undistortable member.

SEE OR SEARCH CLASS:

- 251, Valves and Valve Actuation, subclass 63.4 for an expansible chamber valve actuator having a lost motion or abutment connection between the actuator and the valve.

- 130** This subclass is indented under the class definition. Apparatus including a separate means other than the working fluid associated with the working member for continuously exerting a force in one direction of movement of the working member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 7, for an overcenter means for biasing a working member in one direction during a portion of the stroke, and in the opposite direction during a second portion of the stroke.
- 40, for a biasing means for a bellows type expansible chamber wall portion.
- 84, for a resilient element interposed between a working member and a relatively movable power element.
- 85, for a device which acts on a working member over a portion only of the stroke thereof to form a cushioning means for the working member.
- 94+, for a biasing means for a flexible wall type working member.

SEE OR SEARCH CLASS:

- 251, Valves and Valve Actuation, subclass 63.6 for an expansible chamber valve actuator which includes spring means biasing the working member of the expansible chamber device.

- 131** This subclass is indented under subclass 130. Apparatus in which the working member is normally maintained in a position intermediate the ends of the working chamber by said force exerting means, so that upon removal of the force exerted to move the working member in

the operation of the expansible chamber device, the working member is returned to such position by said force exerting means.

- 132** This subclass is indented under subclass 130. Apparatus in which the force exerting means comprises a spring device, said spring device being so related to the working member that movement of the working member responsive to the action of working fluid or a mechanical force to effect normal operation of the working member causes said spring device to be extended from its normal position of equilibrium, so that upon removal of such force, the spring contracts to effect the return movement of said working member.

- 133** This subclass is indented under subclass 130. Apparatus in which the amount of force exerted by said force exerting means on the working member may be selectively increased or decreased.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 95, for an adjustable biasing means for a flexible wall type working member.

- 134** This subclass is indented under subclass 130. Apparatus in which the force exerting means comprises a body of confined compressible fluid.

SEE OR SEARCH CLASS:

- 138, Pipes and Tubular Conduits, subclasses 30+ for an accumulator chamber adapted to receive a fluid on one side of a movable wall and a confined compressible fluid on the opposite side of the movable wall.

- 135** This subclass is indented under subclass 130. Apparatus in which the force exerting means includes a portion thereof in force transmitting engagement with the working member end face.

- 136** This subclass is indented under the class definition. Apparatus including means forming a part of the working member for engagement with a relatively movable element, said means comprising (1) a spline extending longitudinally of the working member, (2) gear teeth or (3) a thread.

- (1) Note. A piston having a portion thereof provided with a threaded or splined section for the sole purpose of securing a second piston portion rigidly therewith is excluded from this subclass. Such structure is classified below on other features.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 31+, for a rectilinearly moving working member and coaxial element interengaged for relative rotary movement in which the interengaging means includes a thread or spline on the working member.
217+, for an open ended skirt type piston formed of several parts in which the parts are detachably secured together by means of a threaded connection.
255+, for a piston formed of several parts in which the parts may be secured together by means of a threaded connection.

- 137** This subclass is indented under the class definition. Apparatus including a flexible elongated element secured to the working member and movable with the working member, said elongated element functioning as a means for transmitting power to or from said working member.

- (1) Note. Included in this subclass for example is a rope, chain or cable having one end thereof connected to a piston and the other end connected to a load wherein movement of the piston will move the load.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 84, for a resilient element interposed between a working member and a relatively movable element.
130+, and the search there noted, for a spring device having one end thereof secured to a working member and being effective to bias said working member in one direction of its movement.

- 138** This subclass is indented under the class definition. Apparatus comprising a working member having a pair of axially spaced end faces, and a portion located between and rigidly secured to said end faces, said portion having means formed thereon to engage with a mechanical motion converting linkage or power transmission member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 74, for a plurality of relatively movable working members, each working member having spaced end faces and a rotating shaft engaging portion intermediate said end faces, said working members being positioned side by side in parallel relationship.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclass 174 for a plurality of relatively movable working members, each working member having spaced end faces and a linkage or transmission engaging means intermediate said spaced end faces.

- 139** This subclass is indented under the class definition. Apparatus comprising a piston type working member, adapted to reciprocate within a cylinder, said piston type working member being provided with a member pivotally secured thereto and extending coaxially therewith, said member being slidably engageable with the walls of the cylinder in which the piston reciprocates to guide the piston in its movement in the cylinder.

- 140** This subclass is indented under the class definition. Apparatus including means for transmitting a force to or from a working member, said means comprising a plurality of mechanically interconnected members which are movable relative to each other, one of said members being connected for movement with the working member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 13.7, for a working member having a relatively movable power transmission element and means adjusting or limit-

ing the motion of said transmission element to vary the working member stroke.

- 68+, for a plurality of relatively moving working members provided with mechanical motion converting means connecting said working members to a common rotary shaft.
- 76, for a plurality of relatively movable working members interconnected by a linkage having relatively movable members.
- 136+, for a linkage or transmission arrangement associated with an expansible chamber device and in which such linkage or transmission includes a gear, thread or spline rigid with working member.
- 137, for linkage or transmission means associated with an expansible chamber device, including a flexible element secured to the working member.
- 138, for an expansible chamber device provided with a working member having a pair of spaced end faces and a linkage or transmission means engaging the working member at a point intermediate the spaced end faces.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, appropriate subclasses for a mechanical movement or mechanism of general utility. Class 74 takes a nominally claimed expansible chamber device combined with a power transmitting linkage or transmission. (For a more detailed statement of the line between Class 74 and Class 92, see References to Other Classes of the class definition).

- 141** This subclass is indented under the class definition. Apparatus including a plate-like member detachably secured to a portion of the working member, said plate-like member being for the purpose of diverting a fluid away from some part of the expansible chamber device, or a part associated with the expansible chamber device.

- 142** This subclass is indented under the class definition. Apparatus comprising a chamber associated with the expansible chamber device, said chamber being separate from that portion of the

working chamber traversed by the working member and being in open communication therewith and forming a storage space for a noncompressible liquid type working fluid when said fluid is not in that portion of the working chamber traversed by said working member.

- (1) Note. A mere pipe or conduit leading to the portion of the expansible chamber device traversed by the working member does not constitute a reservoir for this subclass. For classification in this subclass the device must include a container-like structure into which the working fluid is exhausted upon being expelled from the portion of the chamber traversed by the working member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 81, for a working member provided with a chamber forming a reservoir for a noncompressible liquid-type working fluid.
163+, for a fluid conduit or port to a working chamber.

- 143** This subclass is indented under the class definition. Apparatus comprising means associated with the expansible chamber device to (1) resist or slow down the movement of the working member or (2) absorb shock or vibration incident to the operation of the expansible chamber device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 7, for an overcenter means to bias the working member in opposite directions over different portions of the stroke.
8, for a means to control the flow of non-working arresting fluid for the working member.
41, for a vibration damping means for a bellows type expansible chamber device.
84, for a resilient element interposed between a working member and a relatively movable power transmission element.

- 85, for a means effective over a portion only of the stroke to cushion the movement of the working member.
130+, and the search there noted for a separate means to bias a working member in one direction of its movement.

- 144** This subclass is indented under the class definition. Apparatus comprising a working chamber forming member provided with a housing, spaced from and enclosing the outer wall thereof to form a space between said structure and outer wall which space is designed to (1) form a jacket for circulating a heat exchange fluid therein or (2) form an insulating space to reduce the flow of heat to or from the working chamber through the walls of said member.

- (1) Note. A cylinder head or end closure provided with a heat exchange modifying space or jacket is included under this definition.

SEE OR SEARCH CLASS:

- 123, Internal-Combustion Engines, subclasses 41.72+ and subclass 195 for a jacketed cylinder or end closure therefor for receiving circulating heat exchange liquid to cool the operating parts of an internal combustion engine. A specific disclosure that a jacketed cylinder or end closure therefor is to form a part of an internal combustion engine is sufficient for classification in Class 123.
165, Heat Exchange, appropriate subclasses for a heat exchange modifying space or jacket of general utility. Class 165 takes a nominally claimed cylinder or working chamber forming member of an expansible chamber device, where the claim is otherwise directed to a surrounding space or jacket designed to modify the heat exchange properties of the cylinder or member.
220, Receptacles, subclasses 592.01+ for a receptacle having means for maintaining its contents above or below ambient temperature and particularly subclass 592.05 for such a receptacle having spaced walls.

145 This subclass is indented under the class definition. Apparatus in combination with features other than working fluid conducting or admitting means, working chamber supporting or retaining means, working member sealing, guiding or movement facilitating means, or mechanical motion converting means articulated to a working member and not provided for above.

- (1) Note. Fluid conducting or admitting means includes a conduit, groove, channel or port designed to conduct fluid to or from the working chamber.
- (2) Note. Working chamber supporting or retaining means includes a means such as a casing, bedplate or framework for holding or maintaining a working chamber forming member of an expansible chamber device in a position for operation.
- (3) Note. Working member sealing, guiding or movement facilitating means includes piston rings or seals, guiding structure on a cylinder end member for encircling and maintaining a piston portion to a predetermined path of motion and lubricating features, special cylinder and piston surface structure or configuration to facilitate the movement of the piston in the cylinder.
- (4) Note. A mechanical motion converting means articulated to a working member includes a connecting rod or similar power transmitting element which is movably secured to the piston.
- (5) Note. In this subclass for example are combinations with (a) a heating element within the working chamber to evaporate a working fluid which has condensed (b) a tool for radially adjusting a piston side wall portion, said tool being mounted on the cylinder head or end closure (c) a piston having a hook at one end thereof to retrieve or grapple parts which may become detached or broken from the piston.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 128, for a combined expansible chamber device and a tool designed to facilitate assembly or disassembly of some part of the expansible chamber device.
- 161, for a nominally claimed art device (e.g., bicycle, chair) which forms a support for the expansible chamber device, no more of the art device being claimed than that necessary to mount or support the expansible chamber device.

146 This subclass is indented under the class definition. Apparatus comprising (1) two or more cylinders adapted to receive reciprocatory working members, said cylinders being rigidly secured together in a unitary structure, or (2) a frame or support having means associated therewith for rigidly securing two or more cylinders together.

- (1) Note. A single axially extending hollow tubular element provided with a fixed partition for dividing the same into two distinct chambers is included under this definition, also included under this definition is a single axially extending hollow element having portions along its length of different cross-sectional areas which portions form separate working chambers. However, a single axially extending hollow tubular element of uniform diameter in which the sole means for dividing the same into two chambers is a reciprocatory working member is not considered to constitute two or more cylinders for this subclass and is excluded. Such structure is classified below on other features.
- (2) Note. Class 92 excludes multiple expansion type motors and multistage pumps even if no valving is claimed if the claims do include the fluid connection between stages of the motor pump.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 56+, for a plurality of unitarily mounted rotating cylinders.

- 61+, for relatively movable working members positioned in plural unitarily mounted cylinders.
- 161, for a support or frame for a single cylinder.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclasses 152+ for multiple expansion type motors and subclasses 508+ for an expansible chamber type motor having a plurality of working members.
 - 123, Internal-Combustion Engines, subclasses 52.1+ for an internal combustion engine having a plurality of unitarily mounted cylinders, subclass 195 for a frame construction for an internal combustion engine having a plurality of unitarily mounted cylinders.
 - 180, Motor Vehicles, subclasses 55+ for a motor vehicle having its motor mounted partly or wholly on the vehicle's lower running gear; subclass 63 for a motor vehicle having its motor mounted on the vehicle's body or body frame, connected to the vehicle's rear axle, and movable with the axle relative to the body or body frame; subclasses 291+ for a motor vehicle having a specific motor-to-body-frame relationship; and subclass 312 for a motor vehicle having a frame which is provided with structure adapted to receive or support a motor, a change-speed gearing, or some other element of the vehicle's power train.
 - 417, Pumps, subclasses 244+ for pumps having successive stages.
- 147** This subclass is indented under subclass 146. Apparatus including means to enclose or support a mechanical motion converting linkage including a rotary shaft, said means being rigidly secured to the cylinder supporting means to form a unitary structure therewith.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 68+, for a plurality of unitarily mounted cylinders having pistons therein, said pistons being connected to a crankshaft.

- 148** This subclass is indented under subclass 147. Apparatus comprising three or more cylinders arranged with the axes thereof lying in angularly related planes which intersect at a common line.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 72, for three or more radially arranged cylinders provided with relatively movable working members secured by mechanical motion converting means to a common rotating shaft.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 247+ for a volume or rate of flow meter of the expansible chamber type having a plurality of radially arranged cylinders.
- 91, Motors: Expansible Chamber Type, subclasses 491+ for expansible chamber type motors having three or more cylinders arranged in radial relationship with a rotary transmission axis.
- 123, Internal-Combustion Engines, subclasses 54.1+ for an internal combustion engine having a plurality of radiating cylinders.
- 417, Pumps, subclass 273 for expansible chamber type pumps having three or more cylinders arranged in radial relationship with a rotary transmission axis.

- 149** This subclass is indented under subclass 147. Apparatus in which a pair of cylinders are positioned with the axis thereof lying in angularly related planes, said planes extending at an angle of less than 180 degrees relative to each other.

- 150** This subclass is indented under subclass 147. Apparatus in which the cylinders are positioned end to end and have a common longitudinal axis.

- 151** This subclass is indented under subclass 146. Apparatus in which the cylinders are positioned end to end and have a common longitudinal axis.

- (1) Note. A mere axially extending hollow tubular element of uniform diameter, in which the sole means for dividing the same into two chambers is a reciprocating working member, is not considered as constituting plural cylinders, and is excluded from this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 150, for coaxial cylinders combined with a casing or support for a rotary shaft.

SEE OR SEARCH CLASS:

- 123, Internal-Combustion Engines, subclasses 58.2+ for an internal combustion engine having a plurality of tandem cylinders.

- 152** This subclass is indented under subclass 151. Apparatus in which the cross sectional area of a first of said cylinders is smaller than the cross sectional area of a second of said cylinders.

- 153** This subclass is indented under the class definition. Apparatus including (1) means to, apply, direct or conduct a substance to a location between relatively movable parts of an expansible chamber device designed to reduce the friction between said parts or (2) means forming a part of an expansible chamber device, which means is formed of a material which is normally applied between relatively movable elements to reduce the friction between said elements.

- (1) Note. Included under this definition are expansible chamber device parts, such as for example, a piston formed of Teflon, mica or a material having a high graphite content or other material known to be self-lubricating.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 141, for a separable deflector plate or baffle on a working member for deflecting lubricant from a portion of the expansible chamber device.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclass 46 for interrelated control of motive fluid and lubricant.
- 123, Internal-Combustion Engines, subclass 196 for lubricating means for an internal combustion engine.
- 184, Lubrication, appropriate subclasses for lubrication of general utility, and particularly subclasses 18+ for lubricating means for an engine cylinder. Class 184 takes a nominal cylinder and piston having lubricating means therefor. For a more detailed statement of the line between Class 184 and Class 92, see section III of the class definition.

- 154** This subclass is indented under subclass 153. Apparatus in which the lubricant is picked up or collected and carried along by working fluid which is entering or being exhausted from the expansible chamber.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, subclass 46 for interrelated control or motive fluid and lubricant.

- 155** This subclass is indented under subclass 153. Apparatus in which a part of the expansible chamber device which is in slidable engagement with another part of such device is formed of material which inherently performs a lubricating function.

- 156** This subclass is indented under subclass 153. Apparatus comprising a passage through which lubricant is adapted to flow and means associated with said passage capable of being operated to selectively open or close said passage.

- 157** This subclass is indented under subclass 153. Apparatus in which a piston is provided with a connecting rod pivotally connected thereto, said rod having an axially extending passage means through which lubricant is conveyed between a lubricant source and a portion of the piston.

- 158** This subclass is indented under subclass 153. Apparatus comprising a piston provided with means for (1) holding or storing lubricant or (2)

conveying or guiding lubricant from one location on the piston to another location thereon.

- (1) Note. Such means may include an open peripheral groove or channel either sectional or continuous, a port, slit, or any opening through a portion of the piston disclosed as for the purpose of conducting lubricant from one point to another.

159 This subclass is indented under subclass 158. Apparatus in which said means includes a cavity, trough, or other means which forms a part of the piston and acts as a reservoir for the lubricant.

- (1) Note. A mere radially directed circumferential oil retaining groove on the piston side wall portion having the open side closed by the relatively movable cylinder wall is excluded. Included is a circumferential groove having a configuration which permits the retention of oil therein independently of the cooperating cylinder wall, or a ported trough or chamber on a piston portion or generally any receptacle means on the piston capable of trapping or collecting lubricant for holding such lubricant or directing the same to some specified outlet in said receptacle means.

160 This subclass is indented under subclass 158. Apparatus in which said means comprises a passage or port which extends completely through a portion of the side wall of the piston so that there is an unobstructed opening from the piston outer periphery to the interior of the piston.

161 This subclass is indented under the class definition. Apparatus including a base, bracket, standard or framework to which a cylinder or other working chamber forming means of an expansible chamber device is secured to be supported in operative position.

- (1) Note. A mere cylindrical sleeve or casing claimed as a pump body, crankcase, cylinder block or engine block, which receives a second sleeve therein claimed either as a cylinder or cylinder liner which forms the inner surface thereof for slidably receiving a piston, is

not considered a support for this subclass and is classified as a cylinder detail in subclasses 169+.

- (2) Note. This subclass will take those patents in which an expansible chamber device is supported on a nominally claimed art device such as a chair or bicycle. However, if the art device is claimed specifically, i.e., more is claimed than that necessary to support the expansible chamber device, classification is generally with art device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 54+, for a cylinder mounted for rotation incident to the reciprocation of a piston positioned therein.
- 77, for a ground embedded expansible chamber device.
- 117+, for a cylinder mounted on a support, said cylinder being mounted for movement relative to said support incident to the operation of the expansible chamber device.
- 146, for a plurality of cylinders secured to a support or frame to be immovable relative to each other when in an operative position. Note section IV of the class definition and the paragraph following the title in the schedule of this class.
- 169+, for a cylinder liner detachably secured in a tubular sleeve-like casing.

SEE OR SEARCH CLASS:

- 123, Internal-Combustion Engines, subclass 195 for a support or frame for an internal combustion engine.
- 180, Motor Vehicles, subclasses 55+, 63, 291+, and 312 as explained in the reference to each appearing in subclass 426 above.
- 248, Supports, appropriate subclasses for a support of general utility, and particularly subclasses 637+ for a machinery support. Class 92 takes the combination of a cylinder or working chamber forming means of an expansible chamber device and a support therefor where some specific structure of the cylinder or working chamber forming means other than means which are

designed solely for the purpose of positioning or securing the cylinder or working chamber forming means to the support is claimed. For example, the mere nominal recitation of “a cylinder having a flange”, “means for positioning the cylinder on a support”, or “openings for the reception of bolts for securing the cylinder to a support”, will not preclude classification in Class 248.

- 161.5** This subclass is indented under subclass 161. Apparatus in which the base, bracket, standard or framework is particularly adapted to be connected to or cooperate with a vehicle wheel.

SEE OR SEARCH CLASS:

- 417, Pumps, subclass 233 for pumps which are operated by a wheel or axle.

- 162** This subclass is indented under the class definition. Apparatus comprising a cylinder and a piston reciprocally mounted therein, and in which a relatively small unobstructed space or passage is provided between the side wall of the piston and the adjacent cylinder wall, said space or passage extending from one end of the piston side wall portion to the opposite end thereof to allow working fluid to flow from the chamber formed at one end of the piston side wall portion to the chamber formed at the opposite end thereof.

SEE OR SEARCH CLASS:

- 188, Brakes, subclass 316 for an internal resistance fluid brake comprising a cylinder and piston, and passage means between the cylinder wall and piston side wall to allow restricted flow of fluid from one end of the piston to the other as the piston moves in the cylinder.
- 277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 411+ for a dynamic close proximity seal (e.g., contactless, fluent, etc.) having a gap or clearance.

- 163** This subclass is indented under the class definition. Apparatus comprising a passage or port adapted to conduct and permit the entry or exhaust of fluid to or from the working chamber of the expansible chamber device, said pas-

sage or port not being in the movable wall portion of said chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 55, for a rotating cylinder provided with a fluid conduit coaxial with the axis of rotation of the cylinder.
- 106, for a fluid conduit in constant communication with a relatively rotating working chamber.
- 110+, for a piston having a hollow rigid stem or rod forming a fluid conduit for introducing or exhausting working fluid to a working chamber.
- 119, for a cylinder having one end thereof pivotally mounted on a supporting structure, and in which the fluid conduit or port for permitting entry or exhaust of working fluid to or from the cylinder extends through the pivoted connection.
- 153+, for a fluid conduit to a working chamber designed to convey lubricant to the chamber.
- 181+, for a fluid conduit or port in the end face of a piston.

SEE OR SEARCH CLASS:

- 91, Motors: Expansible Chamber Type, appropriate subclasses for a fluid port or conduit opening into the working chamber of an expansible chamber which conduit is provided with selectively variable means to control the flow of fluid through the conduit. A mere closure cap or plug for a port or conduit opening into the working chamber of an expansible chamber device is not considered as a means to control the flow of fluid through the port or passage and is classified in Class 92.

- 164** This subclass is indented under subclass 163. Apparatus in which the working chamber is provided with a removable end closure member, the port or passage being located in said member.

- 165** This subclass is indented under the class definition. Apparatus including means formed on an end portion of a cylinder, and being engageable with the piston or a member moved by the pis-

ton, said means being effective to (1) constrain said piston or member to a predetermined path of movement or (2) provide a sealing means between the inside of the cylinder and the outside thereof.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

88, for a self sealing opening in a longitudinal wall of a working chamber for forming a guide for a working member portion.

SEE OR SEARCH CLASS:

384, Bearings, subclasses 7+ for linear bearings. Class 384, Bearings takes a nominally claimed cylinder and end wall therein slidably engaging a rod to guide the same, however, where details of the piston are included in the claim, classification is in this class (92).

166 This subclass is indented under subclass 165. Apparatus comprising a second guide means positioned in the end of the cylinder opposite the end containing said first guide means.

167 This subclass is indented under subclass 165. Apparatus in which the guide means is so related to the cylinder end portion as to be movable relative to the cylinder in a direction perpendicular to the direction of the longitudinal axis of the cylinder.

168 This subclass is indented under subclass 165. Apparatus comprising a nonmetallic sealing element between the cylinder end portion and the piston or element moved by the piston.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclass 18.2 for a flexible sealing element secured to a casing portion and to a reciprocating rod portion to prevent the seepage of fluid into or out of the casing. The mere nominal recitation of a cylinder and piston does not preclude classification in Class 74.

277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 500+ for a dynamic, circumferential, contact seal for other than a piston.

169.1 CYLINDER DETAIL:

This subclass is indented under the class definition. Apparatus comprising particulars of a cylinder.

(1) Note. Patents disclosing a cylinder or working chamber but claiming no more of the disclosed device than what is descriptive of a structure of general utility, such as a tube, container or closure are classified in appropriate structural classes. Examples of claimed features which are considered to be too special to the cylinder art for classification in general structural classes and which cause classification under the definitions are (a) a part or other restricted passage for fluid flow, (b) a nominally claimed piston, (c) the naming of a part as a pump body, engine block, cylinder block, crankcase or the like or (d) a cylinder or liner positioned in a casing or housing and in which the casing or housing closure secures the cylinder or liner within the casing.

(2) Note. A cylinder head or closure, per se, claiming some structure which goes beyond a closure of general utility, and which limits such closure or head for use as a part of an expansible chamber device is included under this definition.

(3) Note. A piston and cylinder combination in which the cylinder is nominally claimed is excluded from this subclass. Such structure is classified below on the structure of the piston.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

51+, for a telescoping cylinder.

107+, for a cylinder adapted to receive an annular working member.

120+, for a cylinder adapted to receive an oscillating working member.

146+, for plural unitarily mounted cylinders.

163+, for a cylinder provided with a fluid conduit or port.

164, for a cylinder and closure provided with a fluid conducting port.

165+, for a cylinder head or closure provided with means to guide a piston or a member moved by the piston.

SEE OR SEARCH CLASS:

123, Internal-Combustion Engines, subclasses 193.1+ for a cylinder for an internal combustion engine.

138, Pipes and Tubular Conduits, appropriate subclasses for the structure of a tubular member even though disclosed as a cylinder for an expansible chamber device. Class 138 takes a cylinder when the claims include no more than the structure of a tubular member.

220, Receptacles, appropriate subclasses for a container and/or closure therefor of general utility. Class 220 takes a nominally claimed cylinder for an expansible chamber device when the claims are directed to no more than the structure of a container. Also Class 220 takes a cylinder or cylinder head therefor to no more than a container or closure therefor.

285, Pipe Joints or Couplings, appropriate subclasses for a joint between a plurality of tubular members or between a tubular member and a plate-like element. Class 285 takes a device comprising a plurality of tubular members and means to join said tubular member together, even though the completed structure may be disclosed as or nominally claimed as a cylinder for an expansible-chamber device. Further Class 285 takes a joint between a tubular member and a plate-like element even though the tubular member may be disclosed as a cylinder.

292, Closure Fasteners, appropriate subclasses for closure fasteners of general utility. Class 292 takes a nominally claimed cylinder and head or closure combined with means to secure the head or closure to the cylinder.

169.2 With reinforcing member:

This subclass is indented under subclass 169.1. Apparatus including structure specifically provided for (a) increasing the rigidity of the cylinder, or (b) strengthening the cylinder, or (c)

bypassing the effect of pressure deformation on the cylinder to a cylinder mounting structure.

169.3 Extending through working member:

This subclass is indented under subclass 169.2. Apparatus wherein the structure of the reinforcing structure comprises a member extending through the working member.

169.4 Coaxial sleeve or tube:

This subclass is indented under subclass 169.2. Apparatus wherein the structure is the reinforcing structure comprises a member extending parallel and concentrically with the working member.

170.1 Nonmetallic piston contacting portion:

This subclass is indented under subclass 169. Apparatus, including a nonmetallic portion of the cylinder adapted to slidably contact a piston.

SEE OR SEARCH THIS CLASS, SUBCLASS:

168, for a cylinder provided with a guide or seal on an end portion thereof including a nonmetallic portion.

171.1 Cylinder or liner retained in casing by casing closure or closure associated means:

This subclass is indented under subclass 169. Apparatus comprising a casing and a cylinder or liner positioned within said casing to be encompassed thereby, and a removable closure for closing an end of the casing, said cylinder or liner being secured in said casing by the closure member, or by means which cooperate with the closure member.

172 This subclass is indented under the class definition. Apparatus comprising a piston as defined in the Glossary of the class definition.

(1) Note. A member secured to the piston so as to be immovable relative thereto (e.g., rigid piston rod) when the piston is performing its intended function in the expansible chamber device is considered as forming a part of the piston.

SEE OR SEARCH THIS CLASS, SUBCLASS:

107+, for a ring shaped piston.

- 108+, for a piston having a rigidly attached axially extending hollow rod or stem.
 120+, for an oscillating piston.

SEE OR SEARCH CLASS:

- 29, Metal Working, subclasses 888.04+ for the method of making a piston.
 91, Motors: Expansible Chamber Type, subclass 422, and see the search there noted, for a valved piston for an expansible chamber type motor.
 123, Internal-Combustion Engines, subclass 47 for a valved piston for use in an internal combustion engine, and subclasses 193.1+ for a piston which is limited for use in an internal combustion engine.
 138, Pipes and Tubular Conduits, subclasses 30+ for a piston disclosed as for use in a variable capacity pressure compensator.
 166, Wells, subclasses 153+ for a piston which is fluid driven into a well.
 173, Tool Driving or Impacting, subclasses 206+ for a piston of a drive motor which forms an impacting hammer head.
 251, Valves and Valve Actuation, subclasses 324+ for a piston which is disclosed as for use in a piston type valve.
 267, Spring Devices, appropriate subclasses for a piston disclosed as for use in a fluid type spring device.
 277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 434+ for a piston ring or piston ring expander or seat therefor.
 417, Pumps, subclasses 545+ for a valved piston disclosed as for use in a pump. A piston of the type in which a peripheral sealing element is adapted to be deflected out of sealing engagement with a chamber wall during a portion of the stroke of such piston, to allow passage of fluid from one side of the piston to the other is not considered a valved piston for Class 417, and is classified in Class 92.

- 173** This subclass is indented under subclass 172. Apparatus including a surface on the piston positioned to be contacted by the working fluid, said surface being so shaped that contact

of the working fluid therewith effects either a rotary movement of said piston about its longitudinal axis or a rotary movement of the body of working fluid about an axis coinciding with the longitudinal axis of the piston.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 31+, for a means to cause rotation of a piston responsive to rectilinear movement of said piston in a cylinder.

- 174** This subclass is indented under subclass 172. Apparatus in which the piston includes a pair of axially spaced rigid side wall portions and a body of liquid positioned between said spaced portions for direct engagement with such chamber wall when said piston is in operative position.

SEE OR SEARCH CLASS:

- 277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 411+ for a dynamic close proximity seal (e.g., contactless, fluent, etc.) having a gap or clearance.

- 175** This subclass is indented under subclass 172. Apparatus in which the piston includes a pair of axially spaced portions each of which includes an end face and a side wall, said spaced portions being rigidly joined by a portion of smaller peripheral extent than the spaced portions.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 138, for a piston provided with spaced faces joined by a rigid stem, in which the stem is provided with a linkage or transmission engaging portion.

SEE OR SEARCH CLASS:

- 251, Valves and Valve Actuation, subclasses 324+ for a spool type piston valve.

- 176** This subclass is indented under subclass 172. Apparatus in which the piston is provided with a sealed space in a portion thereof for the purpose of modifying the heat exchange properties of said piston portion.

- (1) Note. The space may either be filled with a gas, or an insulating material, or may be under a vacuum.

SEE OR SEARCH CLASS:

123, Internal-Combustion Engines, subclass 41.16 for an internal combustion engine piston provided with a closed space having a coolant material sealed in said space.

- 177** This subclass is indented under subclass 172. Apparatus in which the peripheral portion of the piston at the end thereof containing the end face portion has a shape in transverse cross section other than circular.

SEE OR SEARCH THIS CLASS, SUBCLASS:

233, for an open ended hollow skirt type piston in which the skirt has a portion thereof, spaced from the end of the piston containing the end face, oval shaped in transverse cross section.

- 178** This subclass is indented under subclass 172. Apparatus including a ball or roller bearing means mounted on the piston for engagement with a working chamber wall when the piston is in operative position.

SEE OR SEARCH CLASS:

384, Bearings, appropriate subclasses for linear bearings with ball or roller anti-friction contacting surfaces. Class 384 takes a nominally claimed piston and cylinder having ball or roller type anti-friction contacting surfaces.

- 179** This subclass is indented under subclass 172. Apparatus in which the piston is provided with a rod adapted to transmit motion between the piston and a relatively movable member, said rod being pivotally mounted on the piston and having the end thereof which is joined to the piston in direct communication with working fluid when the piston is in operative position in a working chamber.

- 181** This subclass is indented under subclass 172. Apparatus in which the piston is provided with a fluid conducting port or passage extending from the end face thereof through a portion of

the piston and (1) communicating with a cavity in the piston for which the port or passage forms a restricted opening or (2) extending through a wall of the piston other than the end face (3) communicating with a cavity in the piston having a wall which is radially movable and forming a side wall portion of the piston.

- (1) Note. See the search class notes under subclass 172 of Class 92 for a piston having an opening in the face thereof for admitting or exhausting working fluid to or from a working chamber, said opening being controlled by valve means.
- (2) Note. The mere claiming of a flow through passage in a well type pump plunger is not sufficient for classification in this subclass. Such plunger is classified below on its other features.

SEE OR SEARCH CLASS:

188, Brakes, subclasses 316+ for an internal resistance fluid type brake (e.g., dashpot) including a piston having a passage therethrough, for allowing fluid to pass from one side of the piston to the other.

- 182** This subclass is indented under subclass 181. Apparatus in which the port or passage communicates with a cavity in the piston, said cavity having a wall thereof which is radially movable and forming a side wall portion of the piston.

- 183** This subclass is indented under subclass 182. Apparatus in which the port or passage is provided with valve means for controlling the flow of fluid through the port or passage.

- (1) Note. The valve means under this definition must be some means other than a means which has a valving action due to a radial movement of the radially movable wall itself.

- 184** This subclass is indented under subclass 182. Apparatus in which the piston is provided with opposed end faces each of which is provided with a fluid port or passage.

- the class definition under "SEARCH CLASS", 403, for the line between Class 92 and Class 403.
- 185** This subclass is indented under subclass 184. Apparatus in which the ports or passages in the opposed end faces communicate with the same cavity.
- 186** This subclass is indented under subclass 172. Apparatus in which the piston is provided with a chamber having a restricted opening for communicating such chamber with a source of heat exchange fluid.
- (1) Note. The fluid may be the working fluid for the expansible chamber device, or a fluid which is separate and distinct from the working fluid.
- SEE OR SEARCH CLASS:
123, Internal-Combustion Engines, subclasses 41.35+ for an internal combustion engine piston provided with a cavity therein and means to circulate a coolant in said cavity.
- 187** This subclass is indented under subclass 172. Apparatus including a member joined to the piston by means which allow separation of said member from the piston without in any way destroying or permanently deforming the piston or member or the means joining said piston and member together, said member forming a support or bearing member for pivotally mounting a connecting rod to the piston.
- (1) Note. An open ended skirt type piston in which a portion of the skirt is detachably secured to a second portion containing the end face and in which the connecting rod pin bearing portions forms an integral part of such skirt portion or portion containing the end face is excluded. Such structure is classified on other features.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
216+, for an open ended skirt type piston formed of plural separable parts.
- SEE OR SEARCH CLASS:
403, Joints and Connections, subclasses 52+ for articulated connections in general, particularly subclasses 150+. See References To Other Classes. of
- 188** This subclass is indented under subclass 187. Apparatus in which the means for securing the member to the piston comprises a ring-shaped element positioned about the outer periphery of the piston and forms a side wall portion thereof.
- 189** This subclass is indented under subclass 187. Apparatus in which the piston is formed of separate end face and side wall forming portions and in which such portions are secured together by means which allow separation of said portions without, in any way, destroying or permanently deforming the end face or side wall forming portions or the means securing said portions together.
- 190** This subclass is indented under subclass 189. Apparatus in which the means for pivotally mounting the connecting rod to the piston forms the means which secures the end face and side wall portions together.
- 191** This subclass is indented under subclass 187. Apparatus in which the means for joining the member to the piston extends through the end face portion.
- 192** This subclass is indented under subclass 172. Apparatus in which the side wall portion of the piston is provided with a plurality of axially spaced relatively thin flexible metallic tongue-like members extending circumferentially and radially with respect to the piston axis, said tongue-like members being formed as an integral part of the side wall portion and the outer ends thereof forming the outer peripheral extent of the piston side wall portion.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
249+, for a nonmetallic piston formed of flexible material which may be provided with circumferential radially extending sealing tongues.
- 193** This subclass is indented under subclass 172. Apparatus in which the piston is provided with a side wall portion which is movable radially with respect to the piston axis, and a separate

spring device is provided for exerting a force against said portion of urging the same in such radial direction.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

126, for a differential thrust producing means for a working member comprising a spring member for biasing the working member toward one side of the working chamber.

201+, for a piston having a radially adjustable side wall portion.

194 This subclass is indented under subclass 193. Apparatus in which the radially movable side wall portion comprises a lip made of flexible material extending around the periphery of this piston and in a direction axially of the piston, and the spring device exerts a force on said lip for urging the same in a radial direction.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

240+, for a piston having a side wall portion which includes a peripheral axially extending flexible lip.

195 This subclass is indented under subclass 193. Apparatus in which the radially movable side wall portion is, or is a part of an elongated hollow tubular skirt-like member closed at one end by the end face portion and being open at the opposite end.

196 This subclass is indented under subclass 195. Apparatus in which the hollow tubular skirt-like member is provided with a slit in the wall thereof extending from the open end in a direction toward the closed end thereof and in which the spring device is positioned in the slit.

197 This subclass is indented under subclass 195. Apparatus in which the force exerted by the spring device may be selectively increased or decreased.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

199, for a spring means for biasing a side wall portion radially in which the biasing force of the spring is adjustable.

198 This subclass is indented under subclass 195. Apparatus in which the spring device comprises a discontinuous ring-like element made of resilient material, a substantial portion of the periphery of said element being in force exerting engagement with the interior surface of the skirt.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

200, for a split annular type spring for biasing a side wall portion radially.

199 This subclass is indented under subclass 193. Apparatus in which the force exerted by the spring device may be selectively increased or decreased.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

197, for an open ended skirt-type piston provided with a spring member for biasing a portion of the skirt radially, and in which the force exerted by the spring is adjustable. Note "Statement Relating To Placement Of Patents Involving Combination And Subcombination Subclasses" of the Class Definition and the paragraph following the title in the schedule of this class.

200 This subclass is indented under subclass 193. Apparatus in which the spring device comprises a discontinuous ring-like element made of resilient material.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

198, for an open ended skirt-type piston in which the skirt is radially biased by means of a split annular type spring. Note "Statement Relating To Placement Of Patents Involving Combination And Subcombination Subclasses" of the Class Definition and the paragraph following the title in the schedule of this class.

201 This subclass is indented under subclass 172. Apparatus in which means are provided to move and hold a side wall portion of the piston to different positions laterally of the piston axis to vary the peripheral extent of the piston.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 115, for a piston having a radially adjustable side wall portion, and provided with means for moving said side wall portion, said means including an actuator extending through an axially extending hollow rod on the piston.
- 193+, for a spring means for biasing a side wall portion radially.
- 202** This subclass is indented under subclass 201. Apparatus in which the adjustable portion comprises a hollow tubular skirt-like member secured at one end to the end face portion and extending in a direction opposite from the end face, said skirt-like member being open at one end and being closed at the opposite end by the end face portion.
- 203** This subclass is indented under subclass 202. Apparatus in which the means for effecting lateral movement of the skirt-like member comprises an element having a bevelled surface, said element being movable relative to said skirt-like member.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 207, for a radially adjustable side wall portion in which the adjustment is effected by a wedge member movable relative to the side wall portion.
- 204** This subclass is indented under subclass 201. Apparatus in which the means for effecting the radial adjustment of the side wall portion includes a spacer or shim element positionable between relatively movable parts of the piston and which may be optionally inserted between said parts or removed therefrom to effect such adjustment.
- 205** This subclass is indented under subclass 201. Apparatus in which the side wall portion is positioned between and in contact with a pair of rigid axially spaced end members, said end members being capable of being moved and held to different positions toward or away from each other, movement of said end members effecting lateral movement of the side wall portion.
- 206** This subclass is indented under subclass 205. Apparatus in which the surfaces of one of said rigid end members and side wall portion at the point of contact between said member and portion are beveled.
- 207** This subclass is indented under subclass 201. Apparatus in which the means for effecting lateral movement of the side wall portion comprises an element having a beveled surface and being movable relative to said side wall portion, so that movement of said element relative to the side wall portion effects lateral movement of said portion.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 203, for an open ended skirt-type piston in which the skirt is radially adjustable and in which the adjustment is effected by a wedge member movable relative to the skirt. Note "Statement Relating To Placement Of Patents Involving Combination And Subcombination Subclasses" of the Class Definition and the paragraph following the title in the schedule of this class.
- 206, for a radially expansible side wall portion positioned between axially spaced relatively movable end members, and in which the abutting surfaces between an end member and the side wall portion are beveled to provide a wedging action.
- 208** This subclass is indented under subclass 172. Apparatus in which the peripheral portion of the piston includes a hollow tubular skirt-like member secured to and extending in a direction opposite from the end face portion, said skirt-like member being open at one end thereof and being closed at the opposite end by said end face portion.
- 209** This subclass is indented under subclass 208. Apparatus in which the skirt-like member is frusto-conical in shape.
- 210** This subclass is indented under subclass 208. Apparatus including means adapted to be added to or removed from the piston to vary the weight of the piston for the purpose of (1) equalizing the weight of the piston with respect

to another piston with which the piston is to be associated or (2) equalizing the weight of a portion of the piston with respect to another portion of the piston.

- (1) Note. This subclass includes pistons provided either with integral projections which may be cut away as desired to vary the weight of the piston or with separate weight elements which may be attached or removed from the piston to vary the weight of the piston.

- 211** This subclass is indented under subclass 208. Apparatus in which the piston is provided with a circumferentially extending expansible ring positioned in a groove on the outer periphery of the skirt-like member, and a substantially rigid elongated member formed of material which is different from the material which forms the skirt-like member, said member extending diametrically across the interior of the skirt-like member and having an end thereof extending through an opening in the wall of the skirt-like member and abutting against said ring.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 188, for a separable transversely extending wrist pin for a connecting rod retained in position by a piston ring.

- 212** This subclass is indented under subclass 208. Apparatus in which the piston includes as an element thereof a portion which is formed of material other than metal.

- (1) Note. Since few trunk type pistons include nonmetallic parts, all trunk type pistons which include a part formed of nonmetallic material are classified in this subclass. Normally the nonmetallic portion is for the purpose of modifying the transfer of heat between piston parts.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 248, for a piston having a nonmetallic portion.

- 213** This subclass is indented under subclass 208. Apparatus in which the end face surface is provided with a portion made of material which is

different from the material which forms another portion of said end face.

- 214** This subclass is indented under subclass 208. Apparatus in which the skirt-like member is formed at a portion thereof extending for the full perimetric extent thereof with a pair of walls which are spaced from each other.

- 215** This subclass is indented under subclass 208. Apparatus comprising independent end face and skirt portions, said portions being secured together by means of a separate fastening element in the form of a spring-like device for effecting a resiliently movable connection between said end face and skirt portions.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 84, for resilient means interposed between a working member and a relatively movable power transmission element.

- 216** This subclass is indented under subclass 208. Apparatus in which the piston is formed of a plurality of parts or sections, joined together by means which allow separation of the parts from each other without in any way destroying or permanently deforming any of the parts or the means for joining the parts.

- (1) Note. For classification under this definition, the parts must constitute a major portion of either the end face or side wall portion of the piston. A mere ring positioned in a groove about the periphery of the skirt, for example, which forms but a small area of the side wall portion is excluded. Such subject matter is classified on other features.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 187+, for a separable means for pivotally mounting a connecting rod to a piston.
190, for a piston having separable end face and skirt portions secured together by an element which forms a pivot mounting for a connecting rod.
226, for an annular element of diverse material positioned about the periphery of the skirt to limit radial movement of a skirt part.

255, for a piston having plural separable parts.

SEE OR SEARCH CLASS:

403, Joints and Connections, appropriate subclasses for joints in general. Class 92 takes a joint between metallic parts where the sole disclosure is directed to a piston structure.

217 This subclass is indented under subclass 216. Apparatus in which the parts are provided with cooperating interengaging portions such that the rotation of one of the parts relative to the other will cause engagement of said interengaging portions to detachably secure the parts together.

218 This subclass is indented under subclass 217. Apparatus including a separate element interengaging between the relatively rotatable piston parts, said element when in operative interengaging position being effective to prevent relative rotation between the parts.

219 This subclass is indented under subclass 216. Apparatus in which separable parts of the piston are so interfitted or related as to remain joined in operative relation to one another without the addition of a connecting or fastening member which is intended to be entirely detached from the parts when the parts are disconnected.

220 This subclass is indented under subclass 216. Apparatus in which the parts are secured together by means of a separate threaded fastener member.

221 This subclass is indented under subclass 220. Apparatus in which the threaded fastener is in the form of a bolt or screw which extends through the end face portion of the piston, and in which the head of such bolt or screw is accessible from the side of the end face portion which constitutes the pressure receiving surface of the piston.

SEE OR SEARCH THIS CLASS, SUBCLASS:

191, for a threaded fastener for securing a separable connecting rod mounting means to a piston, said fastener

extending through an end face portion of the piston.

222

This subclass is indented under subclass 208. Apparatus in which the piston or a portion thereof is composed of (1) two or more different materials (2) a single material which has been treated to provide portions of the piston with specific properties which are different from the properties of another portion thereof (3) a specific material or (4) a welded brazed or soldered joint.

(1) Note. Under part (3) the mere recitation that the piston is formed of iron, steel or aluminum is excluded since such subject matter is extremely common in this art. However specifying, for example, a combination iron and steel or iron and aluminum, or a specific alloy is included.

SEE OR SEARCH THIS CLASS, SUBCLASS:

195, for an open ended skirt-type piston provided with a separate spring member for biasing a portion of the skirt radially, said spring member being normally formed of material which is different from the material forming the piston.

211, for an open ended skirt-type piston provided with an element of diverse material extending through a wall of the skirt, and abutting against a circumferentially extending resilient ring positioned on the outer periphery of the skirt.

212, for an open ended skirt-type piston provided with a nonmetallic portion.

213, for an open ended skirt-type piston in which the end face surface has portions thereof formed of different kinds of material.

257, for a piston having a side wall portion interposed between separable axially spaced rigid members.

SEE OR SEARCH CLASS:

420, Alloys or Metallic Compositions, appropriate subclasses for an alloy, per se. Class 420 also provides for a nominal piston made of a specific alloy.

- 223** This subclass is indented under subclass 222. Apparatus in which one of the materials is in the form of a thin layer of metal applied to the surface of the end face or skirt-like member of the piston and which forms a unitary part thereof.

SEE OR SEARCH CLASS:

- 428, Stock Material or Miscellaneous Articles, appropriate subclasses for a stock material product in the form of a plural layer or coated article, and especially subclasses 375+ for a coated or bonded rod or strand. Class 428 takes a nominally recited piston having a surface thereof provided with a specific coating. However, a limitation in a claim that the coated surface constitutes a specific part of the piston, such as the head or skirt, for example, is considered a structural limitation and indicates classification in Class 92.

- 224** This subclass is indented under subclass 222. Apparatus in which the end face portion of the piston is formed of material which is different from the material forming a major portion of the outer peripheral portion of the skirt-like member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 213, for an open ended skirt-type piston in which the end face surface has portions thereof formed of different kinds of material.
- 223, for an open ended skirt-type piston in which the end face or skirt is provided with a surface coating which constitutes a material for such portion different from the material forming the other portion.

- 225** This subclass is indented under subclass 222. Apparatus in which the piston is provided with an element formed of material other than the material forming the skirt-like member, said element being positioned in engagement with a skirt portion, and being effective to restrain movement of said skirt portion in a direction normal to the longitudinal axis of the piston.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 195+, for an open ended skirt-type piston provided with a spring member for biasing a portion of the skirt radially, said spring member being normally formed of material which is different from the material forming the piston.

- 226** This subclass is indented under subclass 225. Apparatus in which the element is in the form of a laminated plate-like member in which the different laminae are composed of different metals.

- 227** This subclass is indented under subclass 225. Apparatus in which the element is in the form of a ring positioned about the skirt-like member and forming a portion of the outer periphery of the skirt-like member.

- 228** This subclass is indented under subclass 225. Apparatus in which the element is secured to the piston by having a portion thereof embedded in a part of the piston in such a way that removal of the member would require a distortion or deformation of such element or piston part.

- 229** This subclass is indented under subclass 228. Apparatus in which the element comprises a ring-like member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 227, for an annular skirt expansion restraining element positioned to encircle the outer periphery of the skirt.

- 230** This subclass is indented under subclass 229. Apparatus in which the axis of the ring-like member extends transversely to the longitudinal axis of the piston and is positioned to encircle a projection on the piston which forms the supporting bearing for a transversely extending piston rod connecting pin.

- 231** This subclass is indented under subclass 222. Apparatus comprising a welded, brazed or soldered joint.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 223, for an open ended skirt-type piston having a surface portion thereof provided with a metal coating which is molecularly bonded to the metal of the piston surface.
- 260, for a piston formed of parts which are welded, brazed or soldered together.
- 232** This subclass is indented under subclass 208. Apparatus in which the skirt-like member is provided with a slit or other separation along the periphery thereof forming a pair of spaced skirt portions, and means to bridge the space between said portions comprising an inwardly bent web or corrugation formed from the material of the skirt-like member, said web or corrugation being resilient to allow relative movement between said skirt portions.
- 233** This subclass is indented under subclass 208. Apparatus in which the cross sectional shape of the skirt-like member for a major portion of its longitudinal dimension is elliptical.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 177, for a noncircular piston.
- 234** This subclass is indented under subclass 208. Apparatus in which the skirt-like member is provided with an elongated relatively narrow aperture extending through the wall thereof normally for allowing relative movement between the parts of the skirt-like member adjacent the aperture.
- SEE OR SEARCH CLASS:
- 91, Motors: Expansible Chamber Type, subclass 174 for a plurality of relatively movable working members, each working member having spaced end faces and a common rotating shaft connected to said working members between said spaced end faces.
- 235** This subclass is indented under subclass 234. Apparatus in which the elongated relatively narrow aperture extends circumferentially of the skirt-like member in a direction normal to the longitudinal axis of the piston.
- 236** This subclass is indented under subclass 235. Apparatus including another elongated relatively narrow aperture extending in a direction which lies at an angle to the direction of the first aperture.
- 237** This subclass is indented under subclass 208. Apparatus in which the free end of the skirt-like member has parts which are circumferentially spaced from each other.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 234+, for a skirt provided with a narrow slit in the wall thereof extending from the free end of said skirt.
- 238** This subclass is indented under subclass 208. Apparatus in which the piston is provided with an apertured connecting rod pin support portion, all parts of said support portion being located within the hollow skirt-like member and radially spaced from the inner periphery of the skirt-like member portion which lies immediately adjacent said connecting rod pin support portion.
- 239** This subclass is indented under subclass 208. Apparatus in which the end face or the skirt portion is provided with (1) a projecting formation in the form of a rib or corrugation or (2) a rigid member secured to an end face and a skirt portion.
- 240** This subclass is indented under subclass 172. Apparatus in which the piston includes around the periphery thereof a lip made of flexible material and extending in a direction axially of the piston, said lip being adapted to be in direct contact with working fluid to be urged in a radial direction thereby when the piston is in operative position in a working chamber.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 194, for a piston having a side wall portion which includes a peripheral axially extending flexible lip, and provided with separate resilient means to bias the lip radially.

- 241** This subclass is indented under subclass 240. Apparatus including an element of a material other than the material forming the lip, said element being embedded in the axially extending lip for reinforcing the same.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 254, for a piston having a flexible nonmetallic portion provided with embedded reinforcing means.
- 242** This subclass is indented under subclass 240. Apparatus comprising a plurality of peripheral axially extending flexible lips, said lips being spaced one from the other in a direction extending along the piston axis.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 192, for a piston having a plurality of integrally formed radially extending resilient metallic sealing tongues on the side wall portion thereof.
- 243** This subclass is indented under subclass 242. Apparatus in which the spaced lips extend in opposite directions axially of the piston.
- 244** This subclass is indented under subclass 243. Apparatus in which each of the axially spaced oppositely facing lips is formed on separate independent members, which members are secured together by means which allow separation of the members from each other without in any way destroying or permanently deforming the members or the means for forming the members.
- 245** This subclass is indented under subclass 240. Apparatus comprising a cup-shaped element formed of flexible material having an imperforate planar portion forming the bottom of the cup and in which the peripheral lip forms the side wall of the cup.
- 246** This subclass is indented under subclass 240. Apparatus in which the flexible lip is formed of metallic material.
- (1) Note. A laminated lip forming member including layers of metallic and nonmetallic material and in which the layer of metallic material forms the outer periphery of the lip, which is adapted to contact the working chamber wall is included under this definition.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 192, for a piston having a plurality of integrally formed radially extending resilient metallic sealing tongues on the side wall portion thereof.
 241, for a nonmetallic lip provided with embedded reinforcing means, and in which the reinforcing means may be a metallic element.
- 247** This subclass is indented under subclass 172. Apparatus in which the piston comprises a pair of spaced relatively axially movable rigid members one of which comprises the end face portion, and a radially movable element forming a side wall portion of the piston interposed between said members so that axial movement of said end face portion relative to said other rigid member responsive to the pressure of working fluid acting on said end face portion causes radial movement of said element.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 205+, for a piston provided with a side wall portion positioned between a pair of axially spaced relatively movable rigid members, and in which the axially spaced members may be moved and held to different positions toward or away from each other to effect radial adjustment of the side wall portion.
- 248** This subclass is indented under subclass 172. Apparatus in which the piston includes a portion made of nonmetallic material.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 125, for a vane like oscillating piston provided with a nonmetallic peripheral sealing portion.
 212, for an open ended skirt type piston provided with a nonmetallic portion.

- 249** This subclass is indented under subclass 248. Apparatus in which the nonmetallic material is of a type which is pliable.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 125, for an oscillating vane type piston provided with a nonmetallic peripheral sealing portion.

- 250** This subclass is indented under subclass 249. Apparatus in which the pliable nonmetallic portion forms a side wall portion and is interposed between a pair of axially spaced relatively axially movable separate rigid elements.

- 251** This subclass is indented under subclass 250. Apparatus in which the flexible nonmetallic portion comprises two or more separate independent elements extending in axially aligned relation.

- 252** This subclass is indented under subclass 251. Apparatus in which the pliable nonmetallic portion comprises three or more separate independent axially aligned pliable nonmetallic elements.

- 253** This subclass is indented under subclass 249. Apparatus in which the flexible portion forms a side wall portion of the piston and includes a pair of axially spaced flexible elements having a nonflexible member interposed between said elements.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 251+, for two or more axially spaced flexible nonmetallic elements interposed between separable rigid members, and including a rigid spacer member positioned between said elements.

- 254** This subclass is indented under subclass 249. Apparatus including means formed of a material other than the material forming the flexible nonmetallic portion of the piston, said means being embedded in the flexible nonmetallic portion for reinforcing the same.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 241, for a piston having a peripheral axially extending flexible lip provided with a reinforcing means embedded in the lip. Note "Statement Relating To Placement Of Patents Involving Combination And Subcombination Subclasses" of the Class Definition and the paragraph following the title in the schedule of this class.

- 255** This subclass is indented under subclass 172. Apparatus in which the piston is formed of a plurality of members joined together by means which allow separation of the parts from each other without in any way destroying or permanently deforming any of the members or the means for joining the parts.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 187+, for a connecting rod pivotally connected to a piston.
216+, for an open ended hollow skirt type piston formed of plural separable parts. Note "Statement Relating To Placement Of Patents Involving Combination And Subcombination Subclasses" of the Class Definition and the paragraph following the title in the schedule of this class.

SEE OR SEARCH CLASS:

- 173, Tool Driving or Impacting, subclass 127 for a piston of a drive motor formed of plural separate parts in which said piston forms an impacting hammer head.
403, Joints and Connections, subclasses 230+ for a joint between a rod and a plate or head. Class 403 takes a joint between a plate or head and a rod even though the plate or head and rod are disclosed and nominally included as a piston and piston rod. Class 92 takes the above combination where some feature of the piston other than that which relates to the joint is included. For a further statement of the line between Class 92 and Class 403, see References To Other Classes of the class definition of this class

(92). Class 92 takes a joint between metallic parts where the sole disclosure is directed to a piston for an expansible chamber device.

- 256** This subclass is indented under subclass 255. Apparatus in which the members are secured together by means of a separate fastening element in the form of a spring-like device for effecting a resiliently movable connection between the members.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 84, for a piston in which the end face portion is movable relative to another portion of said piston, and having a spring device interposed between said portions, such that movement of the end face portion responsive to the action of the motive fluid will effect compression of said spring device.
- 215, for an open ended skirt type piston in which the end face portion is secured to the skirt portion by means of a resilient element.

- 257** This subclass is indented under subclass 255. Apparatus comprising a side wall forming portion and two axially spaced rigid members, said side wall forming portion being interposed between said members, said members being detachably secured together.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 205+, for a piston having a side wall portion interposed between a pair of separable axially spaced rigid members and in which movement of the rigid members toward or away from each other effects radial adjustment of said side wall portion
- 250+, for a piston having a flexible nonmetallic side wall portion interposed between separable axially spaced rigid members.

- 258** This subclass is indented under subclass 257. Apparatus in which the means for detachably securing the members together comprises a rigid elongated stem or rod, the axis of which coincides with the axis of the members.

- 259** This subclass is indented under subclass 255. Apparatus in which the piston includes a side wall portion which abuts and is movable relative to another part, the abutting surfaces of said side wall portion and the other part being bevelled.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 207, and the subclasses there noted for a radially adjustable side wall portion, in which the adjustment is effected by relative movement between the side wall portion and a piston part in which said portion and part have abutting bevelled surfaces.

- 260** This subclass is indented under subclass 172. Apparatus comprising a welded, brazed or soldered joint.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 231, for an open ended skirt-type piston having a portion thereof welded, brazed or soldered to another portion. Note "Statement Relating To Placement Of Patents Involving Combination And Subcombination Subclasses" of the Class Definition and the paragraph following the title in the schedule of this class.

- 261** This subclass is indented under the class definition. Subject matter not provided for in other subclasses.

- (1) Note. For example this subclass includes a housing for a mechanical motion converting linkage or transmission disclosed as being interconnected with an expansible chamber device, and not classifiable elsewhere.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 147+, for a housing or support for a rotatable shaft combined with a plurality of unitarily mounted cylinders.
- 161, for a support or frame for an expansible chamber device which may include a housing or support for a rotatable shaft.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, appropriate subclasses for a machine element or mechanism enclosed within a casing or housing. Class 74 takes a housing for a crankshaft, or other Class 74 element where some detail of the crankshaft or other element is set forth in the claim. However the claiming of a gear as part of the device enclosed within the casing will effect classification in Class 74 even though no detail of the gear is set forth. Class 92 takes a casing for a shaft or other Class 74 element, where disclosed as being associated with an expansible chamber device, either, per se, or where such element is nominally claimed, unless such structure is classifiable elsewhere on other features.
- 123, Internal-Combustion Engines, subclass 195 for a crankcase for an internal combustion engine.
- 384, Bearings, subclasses 429+ for a crankshaft plain bearing and subclasses 457+ for a crankshaft antifriction bearing which may include a housing or casing for the shaft. The nominal recitation of the crankshaft will not preclude placement in Class 384.

END